

IRRIGATION : ARIZONA

FARMS AND ACREAGE IRRIGATED, IRRIGATION WORKS, COST OF CONSTRUCTION, COST OF OPERATION AND MAINTENANCE,
AND CROPS IRRIGATED

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INTRODUCTION.

This bulletin presents the larger part of the statistics of irrigation for Arizona obtained in connection with the Thirteenth Census. These data, with additional information, will be embodied in a special report of the Census of Irrigation and in the final reports of the Thirteenth Census. The statistics of the number of farms and acreage irrigated, cost of operation and maintenance, and irrigated crops are for the calendar year 1909; those of irrigation works, cost of enterprises, acreage enterprises were capable of irrigating in 1910, and acreage included in projects are of the date July 1, 1910.

These statistics have been collected under the law of February 25, 1910, which contained the following clause relating to irrigation:

Inquiries shall also be made as to the location and character of irrigation enterprises, quantity of land irrigated in the arid region of the United States and in each state and county in that section under state and Federal laws; the price at which these lands, including water rights, are obtainable; the character and value of crops produced on irrigated lands, the amount of water used per acre for said irrigation and whether it was obtainable from national, state, or private works; the location of the various projects and methods of construction, with facts as to their physical condition; the amount of capital invested in such irrigation works.

The information called for by this law which could be supplied by farm operators was obtained on supplemental schedules by the regular census enumerators as a part of the agricultural census. The remaining data, which were supplied by the owners or officials of irrigation enterprises, were obtained on special schedules by special agents. The data relating to number of farms irrigated and irrigated crops are taken from the supplemental schedules, while all data relating to acreage irrigated and to irrigation works and their construction and operation are taken from the special schedules.

In accordance with the law, the data collected have been classified primarily by the state and Federal laws by virtue of which the land was brought under irrigation. The results are presented in detail at the end of this bulletin and summarized in text tables.

Such of the terms used as are not self-explanatory are defined below.

Farms irrigated.—The number of "farms irrigated" is the number of farms on which irrigation is practiced and is equivalent to the term "number of irrigators" used in previous census reports.

Types of enterprise.—The types of enterprise under which the lands irrigated in 1909 are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction, and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who own no interest in the works. Persons obtaining water from such enterprises are usually required to pay for the right to receive water, and to pay, in addition, annual charges based in some instances on the acreage irrigated and in others on the quantity of water received.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization. It is not always possible to distinguish between partnership and cooperative enterprises, but as the difference is slight this is unimportant.

Source of water supply.—Of the terms used in the classification according to source of water supply, none requires explanation except "reservoirs." The only reservoirs which are treated as independent sources of supply are those filled by collecting storm water or from watercourses that are ordinarily dry. When reservoirs are filled from streams or wells, the primary source is considered the source of supply.

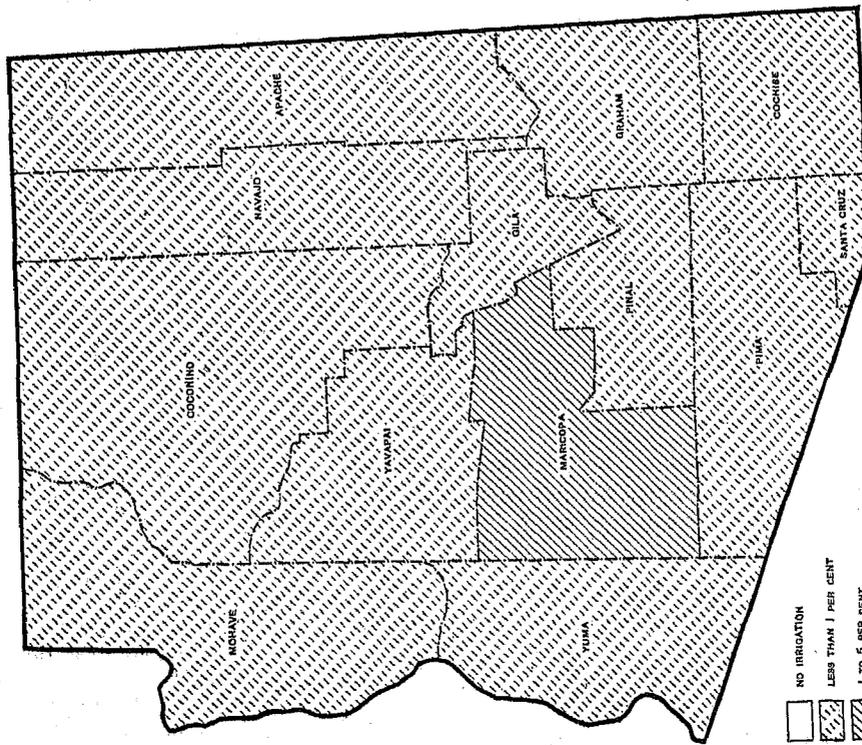
Acre-foot.—The "acre-foot," used to express the capacity of reservoirs, is the volume of water required to cover 1 acre to a depth of 1 foot, or 43,560 cubic feet.

Cost.—The cost of irrigation enterprises is that given by the owners. For the larger works the cost given is taken, in most cases, from the books of account and represents the actual cost. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the cost given represents the owners' estimates. The cost reported for 1910 includes the cost of construction and of acquiring rights. The latter usually consists of filing fees only. In some instances it includes the purchase price of rights, but these cases are so rare that they are unimportant. The cost reported for 1899 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. The average cost per acre is based on the acreage enterprises were capable of irrigating in 1910 and the cost to July 1, 1910.

PER CENT OF TOTAL LAND AREA IRRIGATED, AND PER CENT OF NUMBER OF FARMS IRRIGATED, IN ARIZONA, BY COUNTIES: 1909.

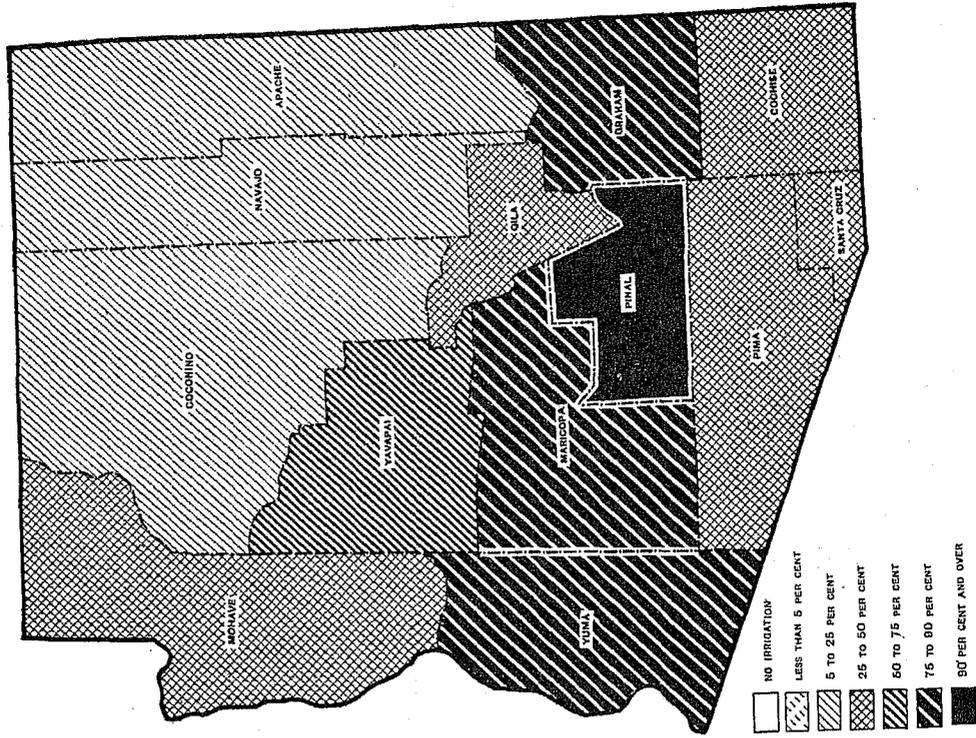
PER CENT OF TOTAL LAND AREA IRRIGATED.

[Per cent for the state, 0.4.]



PER CENT OF NUMBER OF FARMS IRRIGATED.

[Per cent for the state, 52.5.]



FARMS AND ACREAGE IRRIGATED.

Arizona is divided into two sections of widely different topographic and climatic characteristics. The northern and northeastern parts form a plateau, broken by mountains of high altitude, while the southern and southwestern parts consist of broad desert plains, broken by nearly parallel mountain ranges, and traversed by the Salt and Gila Rivers, which supply the greater part of the water used for irrigation in the state. In the western half of Arizona the annual precipitation ranges from 1 to 10 inches and in the eastern half from 10 to 25 inches. Irrigation is necessary to the growth of crops in the low valleys, but on the higher plains some crops are grown without it. The location of the irrigated lands of the state is indicated in a general way by the accompanying maps, which show the class in which each county falls with reference to the percentage which the irrigated land forms of the total land area and the percentage

which irrigated farms represent of all farms in the state.

The following table shows for the state as a whole the number of farms and the acreage irrigated in 1909 in comparison with the total number of farms, the total land area, the total land in farms, and the total acreage of improved land in farms in 1910, together with the areas not yet irrigated for which water has been or is being made available. Comparative statistics for the census of 1900 are included as far as possible. The figures in respect to number of farms and acreage irrigated in 1899 do not include the Indian reservations in Arizona, which were not covered by the irrigation report for that year, and therefore these figures are not strictly comparable with the figures for 1909. In computing the increases in these items, however, the totals for Indian Service irrigation in 1909 have, where possible, been eliminated from the figures for that year.

	CENSUS OF—		INCREASE. ¹	
	1910	1900	Amount.	Per cent.
Number of all farms.....	² 9, 227	³ 5, 809	3, 418	58. 8
Approximate land area of the state..... acres.	72, 838, 400	72, 838, 400	—	—
Land in farms..... acres.	² 1, 246, 613	³ 1, 935, 327	—688, 714	—35. 6
Improved land in farms..... acres.	² 350, 173	³ 254, 521	95, 652	37. 6
Number of farms irrigated.....	⁴ 4, 841	⁵ 2, 981	⁶ 1, 185	⁶ 39. 8
Acreage irrigated.....	⁴ 320, 051	⁵ 185, 396	⁶ 115, 269	⁶ 62. 2
Acreage enterprises were capable of irrigating.....	⁷ 387, 655	(⁸)		
Acreage included in projects.....	⁷ 944, 090	(⁸)		
Percentage irrigated of—				
Number of all farms.....	52. 5	⁶ 73. 8		
Approximate land area of the state.....	0. 4	⁶ 0. 3		
Land in farms.....	25. 7	⁶ 9. 8		
Improved land in farms.....	91. 4	⁶ 81. 4		
Excess of acreage enterprises were capable of irrigating in 1910 over acreage irrigated in 1909.....	67, 604			
Excess of acreage included in projects over acreage irrigated in 1909.....	624, 039			

¹ A minus sign (—) denotes a decrease.

² April 15.

³ June 1.

⁴ In 1909.

⁵ In 1899, exclusive of Indian reservations.

⁶ Not reported.

⁷ Based on figures which are exclusive of Indian reservations.

⁸ July 1.

Number of farms irrigated.—The number of farms given as irrigated in 1909 is made up of the number reported on the supplemental schedules by the regular enumerators, together with an estimate of the number of farms covered by enterprises which were reported by special agents but not by the regular enumerators. This estimate was based upon the average acreage irrigated per farm shown by the supplemental schedules. According to the figures presented in the table, irrigation was practiced on slightly more than one-half (52.5 per cent) of the farms in Arizona in 1909. In 1899 the proportion of irrigated farms among those outside of Indian reservations was 73.8 per cent, while in 1889 it was 75.4 per cent. It is evident that between 1889 and 1899 the number of unirrigated farms increased more rapidly than the number of irrigated farms, while the difference in favor of unirrigated farms has been even more marked during the later decade.

In 5 out of the 13 counties in the state more than half the farms are irrigated, in 3 the proportion is between 40 and 50 per cent, while in 2 it is between 25 and 40 per cent. In the remaining counties—Apache, Navajo, and Coconino—less than one-fourth of the farms are irrigated. These latter counties are in the northeastern portion of the state, where a large percentage of the farms reported are cattle ranches, on which the raising of crops is of secondary importance. Pinal County shows the largest proportion of irrigated farms, 92.8 per cent, and Graham County the next largest, 86.1 per cent.

From 1899 to 1909 the increase in the number of irrigated farms in Arizona, outside of those supplied by Indian Service enterprises, was 39.8 per cent. This percentage of increase was exceeded in five counties, all but one of which are in the southern part of the state, the highest rates of gain being 132.5 per cent in Cochise County, 110 per cent in Yuma County,

and 64.1 per cent in Graham County. In five counties decreases in the number of farms irrigated are shown, while in one county the number of irrigated farms remained the same. For three of the five counties which show decreases in the number of irrigated farms increases in the irrigated acreage were reported, from which fact an increase in the acreage irrigated per farm is apparent.

Acreage irrigated.—The acreage irrigated is taken from the special schedules filled out by agents from information secured from owners or officials of irrigation enterprises and, in some instances, from public records. The acreage thus obtained is considerably larger than the irrigated acreage reported on the supplemental schedules filled out by the farm enumerators. This difference is due in a measure to the fact that the special agents found enterprises which were not reported on any schedules returned by the enumerators, indicating that the acreage reported on the supplemental schedules is to some extent under the true figure. There is a natural tendency, however, for the officials of irrigation enterprises to report as irrigated the entire area of farms of which only a part was irrigated. Furthermore, some farms are so situated as to receive water from more than one enterprise, and may be reported as irrigated by each, which results in duplication. Owing to the two causes last enumerated, it is probable that the acreage irrigated as shown in this bulletin is somewhat excessive, but the extent of this excess can not be determined. It is believed, however, to be less than 10 per cent for Arizona.

The total acreage reported as irrigated in 1909 was 320,051, as against 185,396 acres in 1899 and 65,821 acres in 1889. The acreage given for 1909 includes land lying in Indian reservations, while the figures for 1889 and 1899 do not. The percentage of increase from 1889 to 1899 was 181.7, while that from 1899 to 1909, eliminating lands irrigated by the Indian Service from the total for the latter year, was 62.2.

The percentage of increase between 1899 and 1909 in the acreage irrigated was considerably higher than the percentage of increase in the number of farms irrigated, the acreage irrigated per farm for the state as a whole outside of Indian reservations increasing from 62.2 in 1899 to 72.2 in 1909. During the same period the average size reported for farms in the state decreased from 333.2 acres to 135.1 acres, which change, considered in connection with the increase in the acreage irrigated per farm, indicates that farmers are irrigating larger parts of their holdings than formerly.

The percentage of the total land area of Arizona which was irrigated was 0.4 in 1909 as against 0.3 in 1899, while in the ratio which the irrigated land bears to the total farm acreage reported as improved there

has been an increase from 81.4 per cent in 1899 for the land outside of Indian reservations to 91.4 per cent in 1909 for the state as a whole.

In both 1909 and 1899 the county for which the largest area of irrigated land was reported was Maricopa, with an irrigated acreage of 199,052 and 109,655 at the respective censuses. For only two other counties was an irrigated area in excess of 25,000 acres reported in 1909, while but one additional county had over 10,000 acres of irrigated land in that year. In addition to having the largest irrigated area of any county, Maricopa was also the county in which irrigated land formed the highest percentage of the total land area, the proportion being 3.5 per cent. In no other county was the proportion as high as 1 per cent.

Acreage included in projects.—The foregoing table shows that in 1910 existing enterprises were ready to supply water to 387,655 acres, or 67,604 acres more than were irrigated in 1909. It is probable that, after allowance is made for an increase in the area irrigated in 1910 over that in 1909, there remained at the close of 1910 under ditch but not irrigated at least one-third as much land as was brought under irrigation in the 10 years from 1899 to 1909. The acreage included in projects exceeds the acreage irrigated in 1909 by 624,039 acres, which is more than four times the acreage brought under irrigation in the last decade and almost twice the total area irrigated in 1909. This acreage represents the area which will be available for the extension of irrigation in the next few years upon the completion of existing enterprises and without new undertakings. It indicates in a general way the area available for settlement, although much of this unirrigated land is in farms already settled.

Acreage irrigated, classified by character of enterprise.—The following table gives the distribution of the acreage irrigated in 1909 according to the character of the enterprise controlling the irrigation works. There are no Carey Act enterprises or irrigation districts in the state. Of the 138,364 acres irrigated by the United States Reclamation Service, 134,364 acres are reported as having been irrigated by works which were built by other classes of enterprises and taken over by the United States Reclamation Service.

CHARACTER OF ENTERPRISE.	ACREAGE IRRIGATED IN 1909.	
	Amount.	Per cent distribution.
All classes.....	320,051	100.0
U. S. Reclamation Service.....	138,364	43.2
U. S. Indian Service.....	19,386	6.1
Cooperative enterprises.....	101,025	31.6
Commercial enterprises.....	80	(¹)
Individual and partnership enterprises.....	61,196	19.1

¹ Less than one-tenth of 1 per cent.

Cooperative enterprises and individual and partnership enterprises, which together supplied 50.7 per cent of the acreage irrigated in 1909, are controlled by the water users. United States Reclamation Service enterprises, which are to be turned over to the water users, supplied 43.2 per cent of the acreage irrigated. Thus only a small percentage of the irrigated land is supplied by works which are not either controlled by the water users or to be turned over to them ultimately. The cooperative enterprises, which supplied water for 31.6 per cent of the land irrigated, are principally stock companies, of which the stock is owned by the water users.

Acreage irrigated, classified by source of water supply.—The table following shows the distribution

of the acreage irrigated in 1909 according to the source of water supply. From this table it is apparent that up to the present time the development of sources of water supply other than streams has been unimportant relatively to that of streams.

SOURCE OF WATER SUPPLY.	ACREAGE IRRIGATED IN 1909.	
	Amount.	Per cent distribution.
All sources.....	320,051	100.0
Streams.....	307,778	96.1
Lakes.....	570	0.2
Wells.....	7,585	2.4
Springs.....	3,631	1.1
Reservoirs.....	487	0.2

IRRIGATION WORKS.

The table following summarizes the data collected relating to works for supplying water for irrigation in 1910 and 1900. As only a few of the items reported in 1910 were reported in 1900, there is little opportunity for comparison between the two censuses. The figures shown for the earlier census relate only to systems that obtained water from streams, which supplied 99.5 per cent of the land reported as irrigated in 1899, and do not include statistics for Indian reservations. In computing the percentages of increase, for the sake of securing closer comparability, the figures for Indian Service irrigation have been eliminated from the totals for 1910.

Assuming that the enterprises in operation in 1909 were identical with those reported in 1910, the average acreage irrigated per enterprise in 1909 was 252.2, and the acreage irrigated per mile of main ditch was 185.3. For the enterprises shown for the preceding census, the average acreage irrigated per enterprise in 1899 was 355.3, and the average per mile of main ditch was 123.6.

Considerable attention has been devoted to the utilization of underground water in Arizona for purposes of irrigation. The table shows 214 flowing wells, which in 1909 irrigated 1,489 acres, and 470 wells pumped for irrigation, which supplied 6,096 acres altogether in 1909. Of the flowing wells all but 7 are in Cochise and Graham Counties. Pumped wells

are reported from all counties except Coconino, but more than three-fourths of the number are located in Cochise, Maricopa, and Pima Counties.

Pumping from streams has also been practiced to a considerable extent in some parts of the state, an area of 7,000 acres in the Yuma project of the United States Reclamation Service having been supplied with pumped water in 1909. Upon the completion of the project, however, these lands will be supplied by gravity diversion. The total acreage irrigated with pumped water in 1909 was 13,807.

IRRIGATION WORKS.	CENSUS OF—		INCREASE. ¹	
	1910	1900 ²	Amount.	Per cent.
Independent enterprises.....number..	1,269	519	699	134.7
Ditches, total length.....miles..	2,507	(3)		
Main ditches.....number..	801	510	315	60.7
Length.....miles..	1,727	1,492	116	7.8
Capacity.....cu. ft. per second..	17,200	(3)		
Lateral ditches.....number..	313	(3)		
Length.....miles..	870	(3)		
Reservoirs.....number..	402	(3)		
Capacity.....acre-feet..	1,340,938	(3)		
Flowing wells.....number..	214	(3)		
Capacity.....gallons per minute..	9,953	(3)		
Pumped wells.....number..	470	(3)		
Capacity.....gallons per minute..	765,921	(3)		
Pumping plants.....number..	429	(3)		
Engine capacity.....horsepower..	37,258	(3)		
Pump capacity.....gallons per minute..	851,873	(3)		

¹ Based on figures which are exclusive of Indian reservations.
² Figures relate only to systems obtaining water from streams in 1899, excluding Indian reservations.
³ Not reported.

IRRIGATION—ARIZONA.

COST OF CONSTRUCTION, OPERATION, AND MAINTENANCE.

The table following shows the total cost of irrigation enterprises up to July 1, 1910, including construction of works and acquisition of rights, but not operation and maintenance, with the average cost per acre, based on the acreage the enterprises were capable of irrigating in 1910; the estimated final cost of enterprises completed and enterprises now under construction, with the average cost per acre, based on the acreage included in projects; and the total cost and average cost per acre of operation and maintenance in 1909. Data relating to the cost of construction and maintenance of systems operated in 1899 are included for comparison. The figure for average cost, per acre of operation and maintenance in 1899 does not cover the cost for systems receiving water from wells, but these are comparatively unimportant, having supplied only 974 acres in that year. Indian reservations, as previously stated, are not covered by the figures for the earlier census.

The cost of operation and maintenance is not reported for individual and partnership enterprises, for the reason that farmers whose land is irrigated by such systems generally clean their own ditches at odd times without keeping any record of the time spent. In the case of the larger enterprises this cost represents a cash outlay by the farmers, while in the case of many of the smaller cooperative enterprises the cost is worked out by the farmers.

	CENSUS OF—		INCREASE.	
	1910	1900	Amount.	Per cent.
Cost of irrigation enterprises.....	¹ \$17,677,966	² \$4,438,352	³ \$12,755,635	⁴ 287.4
Average per acre.....	⁴ \$45.60	⁵ \$23.04	(⁶)	.....
Estimated final cost of existing enterprises.....	\$24,828,868	(?)	.....	.....
Average per acre included in projects.....	26.30	(?)	.....	.....
Operation and maintenance:				
Acreage for which cost is reported.....	⁸ 230,429	(?)	.....	.....
Total cost reported.....	⁸ \$214,358	(?)	.....	.....
Average cost per acre.....	⁹ \$0.93	⁹ \$0.82	\$0.11	13.2

¹ Reported July 1.

² Cost of systems operated in 1899, exclusive of Indian reservations.

³ Based on figures which are exclusive of Indian reservations.

⁴ Based on acreage enterprises were capable of irrigating in 1910.

⁵ Based on acreage irrigated in 1899.

⁶ Figures not comparable. (See explanation in text).

⁷ Not reported.

⁸ For 1909.

⁹ Figure relates only to systems obtaining water from streams in 1899.

The cost of irrigation systems shows the largest increase of any item included in the census of irrigation; 287.4 per cent. The average cost per acre shown for 1910 is based on the acreage under ditch in that

year, but since the corresponding acreage for 1900 was not reported, the figure for average cost at the earlier census is based on the acreage irrigated in 1899. If computed on the basis of the acreage irrigated in 1909, the average cost in 1910 would be \$55.23, representing an increase of 130.7 per cent over the figure for the average cost at the census of 1900. The year 1899 was near the close of the period of private and cooperative construction, when most of the works were built by the water users themselves with little or no expenditure of money, and near the beginning of the present period of large-scale construction by corporations and the Federal Government. This later construction is not only on a more extensive scale, but also more difficult and of a better type. Largely as a result of these changed conditions the average cost per acre of irrigation has greatly increased. A number of large enterprises are under construction, upon which considerable expenditures have been made, while but little land is irrigated as yet. This condition tends to make the average cost shown higher than the true average. The average based on the estimated final cost and the acreage included in projects, \$26.30 per acre, probably more truly represents the average cost per acre of irrigation in Arizona.

The county showing the lowest average cost per acre is Graham, which ranks second with respect to acreage irrigated. In Maricopa County, which is first with respect to acreage irrigated, the average cost per acre is practically the same as in the state as a whole, this county having reported approximately 60 per cent both of the total acreage under ditch in the state in 1910 and of the total cost of works up to July 1, 1910. Yuma County shows the highest average cost per acre, \$259.55, which unusually high average is due to the large preliminary expenditures made on the Yuma project of the United States Reclamation Service. The average cost per acre for Yuma County upon the completion of this and other enterprises now under way is estimated at \$45.83, or slightly more than the average cost up to July 1, 1910, shown for the state.

The acreage for which cost of operation and maintenance in 1909 was reported constitutes 72 per cent of the total acreage reported as irrigated in 1909 and 89 per cent of the acreage reported as irrigated by other than individual and partnership enterprises. The cost reported can be said, therefore, to represent fairly the average annual expense for all but individual and partnership enterprises.

IRRIGATION—ARIZONA.

CROPS.

As previously stated, the data relating to irrigated crops are taken from supplemental schedules filled out by the regular census enumerators. Since the special agents found enterprises which the enumerators had not reported, it is evident that the information relating to irrigated crops is incomplete to some extent. It shows, however, the relative importance of the different irrigated crops and is sufficiently complete to afford reliable averages of yields.

The following table shows the acreage, yield, and value of the principal crops reported as grown under

irrigation in 1909, in comparison with totals for the same crops reported for the entire state. While small quantities of other crops are grown both on irrigated and unirrigated land, the leading crops of the state, as well as the leading crops grown under irrigation, are represented in the table. In the reports of the agricultural census the acreages of seed crops are not generally given, but since the growing of alfalfa seed is coming to be an industry of some importance in the irrigated sections of the country, statistics for this crop are presented here.

CROP.	ACREAGE.			YIELD.			VALUE.	
	Total for state.	Irrigated.		Unit.	Total for state.	On irrigated land.	Total for state.	For irrigated land.
		Amount.	Per cent of total.					
Cereals:								
Corn.....	15,005	7,797	50.0	Bushels.....	208,004	171,007	\$293,817	\$158,093
Oats.....	5,867	5,406	92.1	Bushels.....	189,312	177,057	130,884	127,003
Wheat.....	20,028	17,901	89.4	Bushels.....	362,875	353,175	410,214	398,294
Barley.....	32,897	32,268	98.1	Bushels.....	1,008,442	1,001,611	714,834	711,251
Other grains and seeds:								
Alfalfa seed.....	6,378	6,355	99.6	Bushels.....	22,492	22,264	150,628	150,343
Dry edible beans.....	2,301	759	33.0	Bushels.....	18,457	6,863	44,097	14,712
Hay and forage:								
Timothy alone.....	120	53	44.2	Tons.....	182	54	1,948	911
Timothy and clover mixed.....	143	40	28.0	Tons.....	289	60	4,984	1,200
Clover alone.....	119	118	99.2	Tons.....	119	112	1,255	1,247
Alfalfa.....	66,102	65,369	98.9	Tons.....	194,534	194,171	1,896,456	1,880,244
Other tame or cultivated grasses ¹	2,188	437	20.0	Tons.....	2,987	438	42,812	5,213
Wild, salt, or prairie grasses.....	9,514	1,462	15.4	Tons.....	8,168	1,756	81,987	13,459
Grains cut green.....	19,058	15,266	80.1	Tons.....	29,712	24,291	368,316	285,166
Coarse forage.....	3,980	2,565	64.4	Tons.....	7,762	6,221	84,003	63,628
Sundry crops:								
Potatoes.....	1,151	1,011	87.8	Bushels.....	97,141	66,351	98,597	74,885
Sugar beets.....	² 4,443	4,123	92.8	Tons.....	40,624	47,175	230,887	220,367
Orchard fruits and grapes.....	⁽³⁾	1,518					260,481	174,122
Small fruits.....	² 76	75	98.7				12,087	12,478

¹ Includes millet or Hungarian grass.

² Preliminary tabulation, subject to correction.

³ Agricultural returns show number of trees and not acreage.

Acreage.—Of the entire acreage of the crops for which totals are presented in the table, 84.8 per cent is irrigated, but the proportion irrigated varies widely for the different crops.

Few crops are grown to any great extent in Arizona without irrigation. The only crop covering an acreage in excess of 5,000 of which less than half of the acreage is reported as irrigated is "wild, salt, or prairie grasses," for which the proportion is only 15.4 per cent.

Of the acreage of the combined cereals 85.2 per cent is irrigated. The highest proportion of the acreage of any cereal reported as irrigated is 98.1 per cent for barley and the lowest 50 per cent for corn.

The irrigated area of the hay and forage crops shown in the table forms 84.3 per cent of the total reported. Very little alfalfa is grown without irrigation, 98.9 per cent of the total acreage in this crop being irrigated. For grains cut green the percentage is 80.1, while that for clover alone, which covers only a very small acreage, is 99.2, and that for coarse forage is 64.4.

In the case of each of the miscellaneous crops for which the total acreage is shown more than 85 per cent of the acreage is irrigated.

Of the crops shown in the table, alfalfa covers the largest irrigated acreage, representing 40.2 per cent of the total irrigated acreage of these crops. Barley is second with 19.9 per cent of this total, followed by wheat with 11 per cent, and grains cut green with 9.4 per cent. No other single crop covers as much as 5 per cent of the total acreage of the irrigated crops presented in the table.

While most of the crops irrigated are well distributed geographically, there is a tendency toward the concentration of certain crops in particular localities. This is shown by the statement following, which gives the counties reporting the largest acreages of the principal irrigated crops, with the proportions which they contain of the total irrigated acreages of these crops in the state.

Corn.—Graham County, 28.7 per cent; Maricopa, 16 per cent; Pinal, 13.6 per cent.

Oats.—Apache County, 42.8 per cent; Maricopa, 39.1 per cent; Navajo, 7.6 per cent.

Wheat.—Maricopa County, 49.8 per cent; Pinal, 27 per cent; Graham, 15.3 per cent.

Barley.—Maricopa County, 64.8 per cent; Graham, 16.4 per cent; Pinal, 8 per cent.

Alfalfa seed.—Maricopa County, 95.7 per cent; Yuma, 4.3 per cent.

Alfalfa.—Maricopa County, 67.2 per cent; Graham, 17.5 per cent; Yavapai, 3.2 per cent.

"*Wild, salt, or prairie grasses*."—Apache County, 37.8 per cent; Maricopa, 17 per cent; Santa Cruz, 12.7 per cent.

Grains cut green.—Maricopa County, 36.4 per cent; Pinal, 16.5 per cent; Pima, 14.2 per cent.

Coarse forage.—Maricopa County, 51.6 per cent; Cochise, 17.5 per cent; Yavapai, 16.1 per cent.

Potatoes.—Graham County, 31.7 per cent; Maricopa, 24.2 per cent; Yavapai, 10.8 per cent.

Sugar beets.—Maricopa County, 99.9 per cent.

Orchard fruits and grapes.—Yavapai County, 33.9 per cent; Graham, 23.8 per cent; Maricopa, 18.3 per cent.

Small fruits.—Maricopa County, 54.7 per cent; Pima, 18.7 per cent; Yavapai, 9.3 per cent.

Of the acreage of orchards not bearing that was irrigated in 1909, 1,046 acres, 61.3 per cent was in Maricopa County, 16.8 per cent in Yavapai County, and 5.4 per cent in Yuma County.

Yield.—In the following table the average yields per acre of crops extensively grown both with and without irrigation are shown. The yields on unirrigated land are obtained by subtracting the totals for irrigated crops from the totals for the state.

CROP.	AVERAGE YIELD PER ACRE.		
	On unirrigated land.	On irrigated land.	
		Amount.	Per cent of excess over yield on unirrigated land.
Corn.....bushels..	16.2	22.1	36.4
Oats.....bushels..	26.6	32.8	23.3
Wheat.....bushels..	2.2	26.0	809.1
Dry edible beans.....bushels..	7.5	9.0	20.0
Alfalfa.....tons..	0.50	2.99	498.0
Wild, salt, or prairie grasses.....tons..	0.80	1.20	50.0
Grains cut green.....tons..	1.43	1.50	11.2
Coarse forage.....tons..	1.09	2.43	122.0

The yields on irrigated lands were, in the case of all crops included in the table, higher than those on unirrigated land. The small average yields of wheat and alfalfa on unirrigated land and the resulting large excess in the average yields on irrigated land can not be explained except upon the assumption of a partial failure of the crops on unirrigated land in 1909. In considering these comparisons it should be borne in mind that they are not comparisons of yields on irrigated and on unirrigated land in the same localities, but of yields under irrigation in localities where crops can not be grown to advantage without it with yields in localities where irrigation is not necessary. They do not present, therefore, the relative advantages of farming with and without irrigation in a given community, but rather give one factor for determining the relative advantages of farming where irrigation is necessary and where it is not necessary for the successful growing of crops.

COUNTY TABLE.

The next table gives in detail, by counties, the data summarized above, except those relating to crops. For purposes of comparison the total number of farms in the state, the approximate land area of the state, the total land in farms, and the improved land in farms have been included in the table.

Attention is again directed to the fact that the totals for 1899 do not cover Indian reservations, no report as to irrigation on reservations in Arizona having been made at the Twelfth Census. Consequently, the percentages of increase shown in the table are,

with the exception of those relating to cost of operation and maintenance, based on figures exclusive of Indian reservations.

Certain enterprises extend into more than one county, and in the case of some of these enterprises the reports do not segregate the data by counties. In all cases of this kind a distribution among the counties involved has been made according to the best estimates possible from all the information in the possession of the bureau. It is believed that these estimates are approximately correct.

IRRIGATION—ARIZONA.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910.

[Comparative data for 1899 in italics.]

	THE STATE.	Apache.	Cochise.	Coconino.	Gila.	Graham.	Muricopa.	
1	Number of all farms in 1910.....	9,227	803	1,042	656	515	889	2,229
2	Number of farms irrigated in 1909.....	4,841	184	293	38	251	705	1,726
3	Per cent of all farms.....	52.5	22.9	28.1	5.8	48.7	80.1	77.4
4	Number of farms irrigated in 1899.....	2,931	215	126	50	102	263	1,038
5	Per cent of increase, 1899-1909 ¹	39.8	22.3	132.5	32.0	5.6	64.1	56.5
LAND AND FARM AREA								
6	Approximate land area..... acres.....	72,838,400	7,282,500	3,948,800	11,672,320	2,997,120	4,165,120	5,990,240
7	Land in farms..... acres.....	1,246,613	104,859	309,985	29,054	22,000	72,700	248,271
8	Improved land in farms..... acres.....	850,173	17,954	34,787	5,671	6,660	33,715	172,592
9	Acreage irrigated in 1909.....	320,051	8,863	4,900	901	2,778	38,824	199,052
10	Per cent of total land area.....	0.4	0.1	0.1	(3)	0.1	0.9	3.5
11	Per cent of land in farms.....	26.7	8.4	1.6	3.1	12.6	53.4	80.2
12	Per cent of improved land in farms.....	91.4	49.3	14.1	15.9	41.7	115.2	115.3
13	Acreage irrigated in 1899.....	186,596	7,372	4,989	1,114	3,824	18,297	109,656
14	Per cent of increase, 1899-1909 ¹	82.2	6.3	21.8	51.9	49.0	111.5	77.3
15	Acreage enterprises were capable of irrigating in 1910.....	387,655	9,330	6,488	1,183	3,272	41,223	230,061
16	Acreage included in projects.....	944,090	34,807	14,141	3,223	4,233	52,143	455,361
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS								
CLASSIFIED BY CHARACTER OF ENTERPRISE.								
17	U. S. Reclamation Service, irrigated in 1909.....	138,364						131,364
18	Enterprises were capable of irrigating in 1910.....	164,500						150,000
19	Included in projects.....	370,000						240,000
20	U. S. Indian Service, irrigated in 1909.....	19,386	1,944		365	778	123	4,060
21	Enterprises were capable of irrigating in 1910.....	20,974	1,944		395	823	523	4,060
22	Included in projects.....	36,017	4,730		1,500	1,004	593	5,800
23	Carey Act enterprises, irrigated in 1909.....							
24	Enterprises were capable of irrigating in 1910.....							
25	Included in projects.....							
26	Irrigation districts, irrigated in 1909.....							
27	Enterprises were capable of irrigating in 1910.....							
28	Included in projects.....							
29	Cooperative enterprises, irrigated in 1909.....	101,025	3,985	640	300		34,013	51,205
30	Enterprises were capable of irrigating in 1910.....	120,559	4,012	900	300		34,813	60,465
31	Included in projects.....	360,639	24,237	3,000	1,000		42,730	160,980
32	Commercial enterprises, irrigated in 1909.....	80						
33	Enterprises were capable of irrigating in 1910.....	200						
34	Included in projects.....	1,600						
35	Individual and partnership enterprises, irrigated in 1909.....	61,196	2,924	4,260	236	2,000	4,688	11,703
36	Enterprises were capable of irrigating in 1910.....	81,422	3,374	5,588	488	2,449	5,887	20,936
37	Included in projects.....	175,834	5,840	11,141	723	3,169	8,770	48,581
ACREAGE IRRIGATED								
CLASSIFIED BY SOURCE OF WATER SUPPLY.								
38	Supplied from streams.....	307,778	7,965	3,094	791	2,524	37,396	196,263
39	By gravity.....	300,067	7,965	3,094	791	2,524	37,181	196,263
40	By pumping.....	7,711					155	
41	Supplied from lakes.....	570	550					
42	By gravity.....	570	550					
43	By pumping.....							
44	Supplied from wells.....	7,585	10	1,740		69	948	2,235
45	Flowing.....	1,489		567			898	
46	By pumping.....	6,096		1,173		69	50	2,235
47	Supplied from springs.....	3,631	128	27	110	185	440	530
48	Supplied from reservoirs.....	487	200	39			100	15
49	Total acreage supplied by pumping.....	13,807	10	1,173		69	205	2,235
IRRIGATION ENTERPRISES								
50	Independent enterprises..... number.....	1,269	64	244	20	117	190	88
51	Number in 1899 ²	619	87	86	7	40	85	81
52	Per cent of increase, 1899-1910 ¹	134.7	59.5	577.8	128.6	182.5	422.9	174.2
53	Main ditches..... number.....	891	97	71	20	102	124	64
54	Number in 1899 ²	619	87	86	7	40	85	81
55	Per cent of increase, 1899-1910 ¹	60.7	70.3	97.2	128.6	65.0	284.3	87.1
56	Length..... miles.....	1,727	112	94	17	90	216	433
57	Length in 1899 ²	1,492	80	61	8	64	158	448
58	Per cent of increase, 1899-1910 ¹	7.3	35.0	84.3	62.5	14.1	46.4	7.2
59	Capacity..... cubic feet per second.....	17,200	577	349	49	453	1,075	7,468
60	Laterals..... number.....	313	46	3	25	11	10	29
61	Length..... miles.....	870	40	2	20	5	14	525
62	Reservoirs..... number.....	402	32	170	11	3	73	17
63	Capacity..... acre-feet.....	1,349,938	30,456	68	5,428	1	2,950	1,284,013
64	Flowing wells..... number.....	214		90			117	
65	Capacity..... gallons per minute.....	9,953		2,959			6,799	
66	Pumped wells..... number.....	470	4	194		10	9	95
67	Capacity..... gallons per minute.....	705,921	65	27,185		2,858	4,002	617,790
68	Pumping plants..... number.....	420	4	194		11	19	55
69	Engine capacity..... horsepower.....	37,268	7	4,336		43	1,248	26,781
70	Pump capacity..... gallons per minute.....	851,873	65	27,185		2,908	8,517	617,790
COST								
71	Cost of enterprises up to July 1, 1910..... dollars.....	17,677,966	234,838	513,333	42,266	38,667	335,971	10,769,817
72	Cost in 1899 ²	4,438,362	73,766	27,661	9,280	18,767	127,886	5,080,000
73	Per cent of increase, 1899-1910 ¹	287.4	123.0	1,762.5	122.7	47.3	159.4	244.7
74	Average cost per acre enterprises were capable of irrigating in 1910..... dollars.....	45.60	25.17	79.12	35.73	11.82	8.15	45.58
75	Average cost per acre irrigated in 1899 ²	23.84	10.08	6.19	3.72	4.86	6.96	28.14
76	Estimated final cost of existing enterprises..... dollars.....	24,828,898	384,838	513,333	42,266	38,667	346,721	13,418,557
77	Average per acre included in projects..... dollars.....	26.30	11.06	36.30	13.11	9.18	6.65	29.47
OPERATION AND MAINTENANCE								
78	Acreage for which cost is reported.....	230,429	3,985	640	300		32,813	183,229
79	Total cost reported..... dollars.....	214,368	4,074	6,200	604		42,763	140,935
80	Average per acre for which cost is reported..... dollars.....	0.93	1.02	9.69	1.68		1.30	0.77
81	Average cost per acre in 1899 ²	0.62						
82	Per cent of increase, 1899-1909.....	13.2						

¹ Based on figures which are exclusive of Indian reservations.
² Decrease.

³ Less than one-tenth of 1 per cent.

⁴ Acreage irrigated includes wild grass, while improved land in farms does not.

⁵ Figures relate only to systems obtaining water from streams.

⁶ Total cost shown for state includes \$30,194, representing the cost of well systems which was not reported by counties. County figures relate only to systems obtaining water from streams.

⁷ Not reported by counties. Figure relates only to systems obtaining water from streams.

IRRIGATION—ARIZONA.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910—Continued.

[Comparative data for 1899 in italics.]

	Mohave.	Navajo.	Pima.	Pinal.	Santa Cruz.	Yavapai.	Yuma.
1 Number of all farms in 1910.....	111	977	405	614	176	522	288
2 Number of farms irrigated in 1909.....	44	181	188	570	75	207	229
3 Per cent of all farms.....	39.6	18.5	46.4	32.8	42.0	56.9	79.5
4 Number of farms irrigated in 1899.....	58	114	186	160	70	244	90
5 Per cent of increase, 1899-1909 ¹	29.3	57.0		25.0	1.3	21.7	110.0
LAND AND FARM AREA							
6 Approximate land area..... acres.....	8,569,600	6,592,000	6,083,200	3,443,200	786,500	5,216,000	6,391,680
7 Land in farms..... acres.....	4,090	105,689	71,937	43,199	51,874	150,434	32,555
8 Improved land in farms..... acres.....	1,027	11,176	10,504	18,789	6,070	18,097	13,131
9 Acreage irrigated in 1909..... acres.....	1,688	6,458	10,160	25,431	4,773	8,571	7,062
10 Per cent of total land area.....	(3)	0.1	0.2	0.7	0.6	0.2	0.1
11 Per cent of land in farms.....	41.3	6.1	14.1	58.9	9.2	5.7	23.5
12 Per cent of improved land in farms.....	164.4	57.8	96.7	135.4	78.6	47.4	58.4
13 Acreage irrigated in 1899.....	1,419	3,007	8,017	11,297	2,802	8,790	4,418
14 Per cent of increase, 1899-1909 ¹	14.1	61.6	21.2	54.3	80.3	1.8	60.1
15 Acreage enterprises were capable of irrigating in 1910.....	8,726	8,276	11,876	31,100	4,895	9,583	15,687
16 Acreage included in projects.....	40,624	24,997	24,484	89,400	6,872	18,588	177,217
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS							
CLASSIFIED BY CHARACTER OF ENTERPRISE.							
17 U. S. Reclamation Service, irrigated in 1909.....							7,000
18 Enterprises were capable of irrigating in 1910.....							14,500
19 Included in projects.....							130,000
20 U. S. Indian Service, irrigated in 1909.....	69	1,600	1,047	8,000			200
21 Enterprises were capable of irrigating in 1910.....	104	1,600	2,720	8,000			205
22 Included in projects.....	150	2,200	4,480	8,000			7,500
23 Carey Act enterprises, irrigated in 1909.....							
24 Enterprises were capable of irrigating in 1910.....							
25 Included in projects.....							
26 Irrigation districts, irrigated in 1909.....							
27 Enterprises were capable of irrigating in 1910.....							
28 Included in projects.....							
29 Cooperative enterprises, irrigated in 1909.....	155	4,100	1,200	3,900		1,667	100
30 Enterprises were capable of irrigating in 1910.....	6,830	4,300	1,200	5,700		1,730	300
31 Included in projects.....	37,200	12,600	1,400	44,100		2,342	31,000
32 Commercial enterprises, irrigated in 1909.....		80					
33 Enterprises were capable of irrigating in 1910.....		290					
34 Included in projects.....		1,600					
35 Individual and partnership enterprises, irrigated in 1909.....	1,464	678	7,313	13,831	4,773	6,904	302
36 Enterprises were capable of irrigating in 1910.....	1,792	2,176	7,956	17,400	4,895	7,799	682
37 Included in projects.....	3,274	8,597	13,604	37,300	6,872	14,240	8,717
ACREAGE IRRIGATED							
CLASSIFIED BY SOURCE OF WATER SUPPLY.							
38 Supplied from streams.....	1,195	5,855	8,150	25,418	3,503	8,014	7,010
39 By gravity.....	1,065	5,840	8,150	25,418	3,503	7,983	230
40 By pumping.....	130	15				31	7,380
41 Supplied from lakes.....					20		
42 By gravity.....					20		
43 By pumping.....							
44 Supplied from wells.....	8	80	1,600	11	645	97	62
45 Flowing.....						24	
46 By pumping.....	8	80	1,600	11	645	73	62
47 Supplied from springs.....	485	473	270	2	535	437	
48 Supplied from reservoirs.....		50	50		10	23	
49 Total acreage supplied by pumping.....	138	95	1,600	11	645	104	7,432
IRRIGATION ENTERPRISES							
50 Independent enterprises..... number.....	57	17	110	77	66	190	23
51 Number in 1899 ²	34	12	42	41	29	167	8
52 Per cent of increase, 1899-1910 ¹	58.8	38.3	157.1	85.4	127.0	17.4	175.0
53 Main ditches..... number.....	57	28	53	67	45	170	17
54 Number in 1899 ⁵	34	12	42	41	20	167	8
55 Per cent of increase, 1899-1910 ¹	58.8	125.0	21.4	51.2	55.2	5.4	100.0
56 Length..... miles.....	61	87	70	170	64	211	93
57 Length in 1899 ⁶	35	39	108	187	40	293	64
58 Per cent of increase, 1899-1910 ¹	68.6	115.4	241.5	23.0	60.0	29.2	39.1
59 Capacity..... cubic feet per second.....	336	98	698	2,353	170	752	2,822
60 Laterals..... number.....	46	50	9	36	12	24	12
61 Length..... miles.....	7	40	4	57	12	9	135
62 Reservoirs..... number.....	9	11	27	5	10	31	3
63 Capacity..... acre-feet.....	3,124	3,428	135	9,901	135	1,235	4
64 Flowing wells..... number.....		1				0	
65 Capacity..... gallons per minute.....		20				175	
66 Pumped wells..... number.....	3	1	68	25	21	25	16
67 Capacity..... gallons per minute.....	2,170	700	38,820	48,875	17,242	3,047	3,158
68 Pumping plants..... number.....	6	2	62	21	20	21	14
69 Engine capacity..... horsepower.....	112	25	769	779	345	70	2,743
70 Pump capacity..... gallons per minute.....	10,224	2,020	39,243	48,875	17,242	4,071	73,733
COST							
71 Cost of enterprises up to July 1, 1910..... dollars.....	85,948	258,803	427,077	631,034	58,051	219,770	4,071,491
72 Cost in 1899 ² dollars.....	10,670	127,800	40,340	521,200	20,907	151,191	200,000
73 Per cent of increase, 1899-1910 ¹	651.3	102.9	944.3	210.5	177.7	45.4	1,031.7
74 Average cost per acre enterprises were capable of irrigating in 1910..... dollars.....	9.85	31.27	35.96	20.32	11.86	23.04	260.55
75 Average cost per acre irrigated in 1899 ² dollars.....	7.85	43.80	4.08	46.14	8.24	17.32	46.52
76 Estimated final cost of existing enterprises..... dollars.....	320,248	299,915	427,077	631,034	58,051	224,770	8,122,491
77 Average per acre included in projects..... dollars.....	7.88	12.00	17.44	7.07	8.45	13.55	46.83
OPERATION AND MAINTENANCE							
78 Acreage for which cost is reported.....	95	4,100		3,000		1,667	
79 Total cost reported..... dollars.....	700	10,267		4,320		4,595	
80 Average per acre for which cost is reported..... dollars.....	7.37	2.50		1.20		2.76	
81 Average cost per acre in 1899 ² dollars.....							
82 Per cent of increase, 1899-1909.....							

¹ Based on figures which are exclusive of Indian reservations.

² Decrease.

³ Less than one-tenth of 1 per cent.

⁴ Acreage irrigated includes wild grass, while improved land in farms does not.

⁵ Figures relate only to systems obtaining water from streams.

⁶ Not reported by counties.

IRRIGATION : CALIFORNIA

FARMS AND ACREAGE IRRIGATED, IRRIGATION WORKS, COST OF CONSTRUCTION, COST OF OPERATION AND MAINTENANCE,
AND CROPS IRRIGATED

Prepared under the supervision of LE GRAND POWERS, Chief Statistician for Agriculture, by R. P. TEELE, Special Agent in Charge of Irrigation

INTRODUCTION.

This bulletin presents the larger part of the statistics of irrigation for California obtained in connection with the Thirteenth Census. These data, with additional information, will be embodied in a special report of the Census of Irrigation and in the final reports of the Thirteenth Census. The statistics of the number of farms and acreage irrigated, cost of operation and maintenance, and irrigated crops are for the calendar year 1909; those of irrigation works, cost of enterprises, acreage enterprises were capable of irrigating in 1910, and acreage included in projects are of the date July 1, 1910.

These statistics have been collected under the law of February 25, 1910, which contained the following clause relating to irrigation:

Inquiries shall also be made as to the location and character of irrigation enterprises, quantity of land irrigated in the arid region of the United States and in each state and county in that section under state and Federal laws; the price at which these lands, including water rights, are obtainable; the character and value of crops produced on irrigated lands, the amount of water used per acre for said irrigation and whether it was obtainable from national, state, or private works; the location of the various projects and methods of construction, with facts as to their physical condition; the amount of capital invested in such irrigation works.

The information called for by this law which could be supplied by farm operators was obtained on supplemental schedules by the regular census enumerators as a part of the agricultural census. The remaining data, which were supplied by the owners or officials of irrigation enterprises, were obtained on special schedules by special agents. The data relating to number of farms irrigated and irrigated crops are taken from the supplemental schedules, while all data relating to acreage irrigated and to irrigation works and their construction and operation are taken from the special schedules.

In accordance with the law, the data collected have been classified primarily on the basis of the state and Federal laws by virtue of which the land was brought under irrigation. The results are presented in detail at the end of this bulletin and summarized in text tables.

Such of the terms used as are not self-explanatory are defined below.

Farms irrigated.—The number of "farms irrigated" is the number of farms on which irrigation is practiced and is equivalent to the term "number of irrigators" used in previous census reports.

Types of enterprise.—The types of enterprise under which the lands irrigated in 1909 are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction, and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who own no interest in the works. Persons obtaining water from such enterprises are usually required to pay for the right to receive water, and to pay, in addition, annual charges based in some instances on the acreage irrigated and in others on the quantity of water received.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization. It is not always possible to distinguish between partnership and cooperative enterprises, but as the difference is slight this is unimportant.

Source of water supply.—Of the terms used in the classification according to source of water supply, none requires explanation except "reservoirs." The only reservoirs which are treated as independent sources of supply are those filled by collecting storm water or from watercourses that are ordinarily dry. When reservoirs are filled from streams or wells, the primary source is considered the source of supply.

Acre-foot.—The "acre-foot," used to express the capacity of reservoirs, is the volume of water required to cover 1 acre to a depth of 1 foot, or 43,560 cubic feet.

Cost.—The cost of irrigation enterprises is that given by the owners. For the larger works the cost given is taken, in most cases, from the books of account and represents the actual cost. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the cost given represents the owners' estimates. The cost reported for 1910 includes the cost of construction and of acquiring rights. The latter usually consists of filing fees only. In some instances it includes the purchase price of rights, but these cases are so rare that they are unimportant. The cost reported for 1899 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. The average cost per acre is based on the acreage enterprises were capable of irrigating in 1910 and the cost to July 1, 1910.

FARMS AND ACREAGE IRRIGATED.

California is traversed by the Sierra Nevada Mountains and the Coast Range, both of which are parallel to the coast in a general way. The greater part of the agricultural land of the state lies in the great central valley between these ranges and in the portion of the state south of the Kern River Mountains. In most sections of the state there is usually sufficient rainfall for the maturing of some crops, although there are some sections where no crops can be grown without irrigation. The normal annual precipitation ranges from about 2 inches in the Imperial Valley in the southeastern part of the state to about 60 inches along the coast in the northwestern part.

Irrigation is practiced to some extent throughout the state, but the larger part of the irrigated land lies in the southern part of the great central valley and in

the southern part of the state. The location of the irrigated lands of the state is indicated in a general way by the maps on the opposite page, in which the different counties are graphically classified with reference to the percentage which the irrigated land forms of the total land area and the percentage which irrigated farms represent of all farms.

The following table shows for the state as a whole the number of farms and acreage irrigated in 1909, in comparison with the total number of farms, the total land area, the total land in farms, and the total acreage of improved land in farms in 1910, together with the areas not yet irrigated for which water was available in 1910, and the acreage included in projects completed or under way in 1910. Comparative data for the census of 1900 are included as far as possible.

	CENSUS OF—		INCREASE. ¹	
	1910	1900	Amount.	Per cent.
Number of all farms.....	² 88, 197	³ 72, 542	15, 655	21. 6
Approximate land area of the state..... acres..	99, 617, 280	99, 617, 280		
Land in farms..... acres..	² 27, 931, 444	³ 28, 828, 951	-897, 507	-3. 1
Improved land in farms..... acres..	² 11, 389, 894	³ 11, 958, 837	-568, 943	-4. 8
Number of farms irrigated.....	⁴ 39, 352	⁵ 25, 675	13, 677	53. 3
Acreage irrigated.....	⁴ 2, 664, 104	⁵ 1, 446, 114	1, 217, 990	84. 2
Acreage enterprises were capable of irrigating.....	⁶ 3, 619, 378	(?)		
Acreage included in projects.....	⁶ 5, 490, 360	(?)		
Percentage irrigated of—				
Number of all farms.....	44. 6	35. 4	9. 2	
Approximate land area of the state.....	2. 7	1. 5	1. 2	
Land in farms.....	9. 5	5. 0	4. 5	
Improved land in farms.....	23. 4	12. 1	11. 3	
Excess of acreage enterprises were capable of irrigating in 1910 over acreage irrigated in 1909.....	955, 274			
Excess of acreage included in projects over acreage irrigated in 1909..	2, 826, 256			

¹ A minus sign (-) denotes decrease.

² April 15.

³ June 1.

⁴ In 1909.

⁵ In 1899.

⁶ July 1.

⁷ Not reported.

Number of farms irrigated.—The number of farms irrigated is made up of the number reported on the supplemental schedules by the regular enumerators, together with an estimate of the number of farms covered by enterprises which were reported by special agents but not by the regular enumerators. This estimate was based upon the average acreage irrigated per farm as shown by the supplemental schedules.

According to the figures presented in the table, irrigation was practiced on somewhat more than two-fifths (44.6 per cent) of the farms in the state in 1909. In 1899 the proportion of irrigated farms was 35.4 per cent and in 1889 it was only 26 per cent. Thus in both decades the number of irrigated farms increased at a higher rate than the number of unirrigated farms.

In 24 of the 58 counties in the state more than half the farms are irrigated, in 2 the proportion is between 40 and 50 per cent, in 5 it is between 30 and 40 per cent, in 7 between 20 and 30 per cent, and in 8 between 10 and 20 per cent, while in 11 it is less than 10 per cent. No irrigation was reported from Del Norte County in the extreme northwestern part of the state.

In general the counties in which the percentage of farms irrigated is highest are in the south central and southeastern parts of the state where the climate is so dry as to make irrigation almost essential to the successful growing of crops. Along the coast in the northern part of the state and in the region surrounding San Francisco Bay, irrigation is less generally practiced. Imperial County has the largest percentage of farms irrigated, 94.6, and Inyo the next largest, 93.2 per cent.

From 1899 to 1909 the increase in the number of farms irrigated was 9.2 per cent for the state as a whole. Of the 53 irrigated counties which did not change in area during that period, 28 show increases, varying greatly in degree, and 15 decreases, while for 10 comparative figures are not available. Increases are reported for the combined territory of Fresno and Kings Counties and for the territory which constituted San Diego County in 1900 and Imperial and San Diego Counties in 1910.

Acreage irrigated.—The acreage irrigated is taken from the special schedules filled out by agents from information secured from owners or officials of irri-

gation enterprises and, in some instances, from public records. The acreage thus obtained is considerably larger than the irrigated acreage reported on the supplemental schedules filled out by the farm enumerators. This difference is due in a measure to the fact that the special agents found enterprises which were not reported on any schedules returned by the enumerators, indicating that the acreage reported on the supplemental schedules is under the true figure. There is, however, a natural tendency for the officials of irrigation enterprises to report as irrigated the entire area of farms of which only a part was irrigated. Furthermore, some farms are so situated as to receive water from more than one enterprise, and may be reported as irrigated by each, which results in duplication. Owing to the two causes last enumerated, it is probable that the acreage reported irrigated is somewhat excessive, but the extent of this excess can not be determined. It is believed, however, to be less than 10 per cent for the state of California.

The total acreage reported as irrigated in 1909 was 2,664,104 acres, as against 1,446,114 acres in 1899 and 1,004,233 acres in 1889. The percentage of increase from 1889 to 1899 was 44, and that from 1899 to 1909, 84.2. The absolute increase during the latter decade was nearly three times as great as that during the former, amounting to 1,217,990 acres, as against 441,881 acres.

The percentage of increase between 1899 and 1909 in the acreage irrigated was considerably higher than that in the number of farms irrigated, the acreage irrigated per farm increasing from 56.3 in 1899 to 67.7 in 1909. As a decrease from 397.4 acres to 316.7 acres in the average size of the farms of the state was reported for the same period, it is probable that farmers are irrigating larger parts of their holdings than formerly. It is not possible, however, to determine how far this is actually the case, as the higher average size shown for 1900 was due to some extent to the inclusion as farm land in 1900 of some tracts of land used for grazing which were not reported as farm land in 1910.

The percentage which irrigated land formed of the total land area of the state increased from 1.5 in 1899 to 2.7 in 1909, and the percentage which such land formed of all land in farms increased from 5 in 1899 to 9.5 in 1909, while the ratio between the irrigated acreage and the total improved land in farms increased from 12.1 per cent to 23.4 per cent.

In both 1909 and 1899 the county for which the largest area of irrigated land was reported was Fresno, with an irrigated acreage of 402,318 and 283,737 at the

respective censuses. In Tulare County 265,404 acres were irrigated in 1909, and in 5 counties besides the 2 named the area of irrigated lands exceeded 100,000 acres, while in 10 counties the irrigated area was between 50,000 and 100,000 acres.

The county in which irrigated land formed the highest percentage of the total land area in 1909 was Kings, where 25.7 per cent of the land was irrigated.

Acreage included in projects.—The foregoing table shows that in 1910 existing enterprises were ready to supply water to 3,619,378 acres, or 955,274 acres more than were irrigated in 1909. It is probable that, after allowance is made for an increase in the area irrigated in 1910 over that in 1909, there remained at the close of 1910 under ditch but not irrigated considerably more than half as much land as was brought under irrigation in the 10 years from 1899 to 1909. The acreage included in projects exceeds the acreage irrigated in 1909 by 2,826,256 acres, which is more than twice the acreage brought under irrigation in the last decade and somewhat greater than the total area irrigated in 1909. This acreage represents the area which will be available for the extension of irrigation in the next few years upon the completion of projects now under way and without new undertakings. It indicates in a general way the area available for settlement, although much of this unirrigated land is in farms already settled.

Acreage irrigated, classified by character of enterprise.—The following table gives the distribution of the acreage irrigated in 1909 according to the character of the enterprise controlling the irrigation works. There are no Carey Act enterprises in California.

CHARACTER OF ENTERPRISE.	ACREAGE IRRIGATED IN 1909.	
	Amount.	Per cent distribution.
All classes.....	2,664,104	100.0
U. S. Reclamation Service.....	400	(¹)
U. S. Indian Service.....	3,490	0.1
Irrigation districts.....	173,793	6.5
Cooperative enterprises.....	779,020	29.2
Commercial enterprises.....	746,265	28.0
Individual and partnership enterprises.....	961,136	36.1

¹ Less than one-tenth of 1 per cent.

Irrigation districts, cooperative enterprises, and individual and partnership enterprises, which together supplied about 72 per cent of the acreage irrigated in 1909, are all controlled by the water users. Commercial enterprises, the only other class in the state that irrigated any extensive acreage in 1909, supplied 28 per cent of the total irrigated area.

Acreage irrigated, classified by source of water supply.—The following table shows the distribution of the acreage irrigated in 1909 according to the source of water supply.

As in other states, streams are the principal source of supply of water for irrigating, but in California wells supply much more land than in any other state. Much land receives water from both sources, but most of this is credited to streams.

SOURCE OF WATER SUPPLY.	ACREAGE IRRIGATED IN 1909.	
	Amount.	Per cent distribution.
All sources.....	3,664,104	100.0
Streams.....	2,246,722	84.8
Lakes.....	18,470	0.7
Wells.....	350,723	13.2
Springs.....	31,779	1.2
Reservoirs.....	16,410	0.6

IRRIGATION WORKS.

The table following summarizes the data collected relating to works for supplying water for irrigation in 1910. As none of the items reported in 1910 were reported in 1900 for all irrigation works in the state, there is no opportunity for comparisons between the two censuses.

Independent enterprises.....	number..	13,970
Ditches, total length.....	miles..	21,129
Main ditches.....	number..	8,590
Length.....	miles..	12,620
Capacity.....	cu. ft. per second..	89,597
Lateral ditches.....	number..	6,143
Length.....	miles..	8,509
Reservoirs.....	number..	1,583
Capacity.....	acre-feet..	743,269
Flowing wells.....	number..	2,361
Capacity.....	gals. per minute..	477,343
Pumped wells.....	number..	10,724
Capacity.....	gals. per minute..	4,119,575
Pumping plants.....	number..	9,297
Engine capacity.....	horsepower..	128,143
Pump capacity.....	gals. per minute..	5,276,298

Assuming that the enterprises in operation in 1909 were identical with those reported in 1910, the average acreage irrigated per enterprise in 1909 was 190.7, and the acreage irrigated per mile of main ditch was 211.1.

This table and the preceding one relating to source of supply show the extent to which underground water is utilized for irrigation in California. The flowing wells, of which there were 2,361, with a total capacity of 477,343 gallons per minute, irrigated

74,128 acres in 1909. The great majority of these wells are in southern California and the San Joaquin Valley, 93.7 per cent of the total number reported and 96.9 per cent of the land thus irrigated being in Kern, Kings, Los Angeles, Orange, Riverside, San Bernardino, Santa Clara, and Tulare Counties. Of the 10,724 pumped wells reported, 5,248 were in the counties named and 4,503 in Fresno, Merced, Monterey, Sacramento, San Benito, San Diego, San Joaquin, and Ventura Counties. The pumped wells in these two groups of counties irrigated 258,687 of the 276,595 acres irrigated by such wells in the entire state.

Pumping from lakes and streams has also been practiced extensively in many sections of the state, 32,539 acres having been irrigated in this way in 1909. Water pumped from all sources, including lakes, streams, and wells, supplied an area of 309,134 acres. It should be noted that this figure represents only the acreage which received water wholly or mainly from pumps, and hence does not take into account large areas where in addition to a flow from gravity ditches a supplemental supply from pumped wells is received in times of temporary scarcity or drought. The pumping plants and wells so used are included in the totals given in the table, but the acreage thus irrigated is credited to the source of supply upon which the greater dependence is placed.

COST OF CONSTRUCTION, OPERATION, AND MAINTENANCE.

The table following shows the total cost of irrigation enterprises up to July 1, 1910, including construction of works and acquisition of rights but not operation and maintenance, with the average cost per acre, based on the acreage the enterprises were capable of irrigating in 1910; the estimated final cost of enterprises completed and enterprises now under construction, with the average cost per acre, based on the acreage included in projects; and the total cost and average cost per acre of operation and maintenance in 1909. Similar data from the census of 1900, so far as available, are included for comparison.

The cost of operation and maintenance is not reported for individual and partnership enterprises, for the reason that farmers whose land is irrigated by such systems generally clean their own ditches at odd times without keeping any record of the time spent. In the case of larger enterprises this cost represents

a cash outlay by the farmers, while in the case of many of the smaller cooperative enterprises the cost is worked out by the farmers.

	CENSUS OF—		INCREASE.	
	1910	1900	Amount.	Per cent.
Cost of irrigation enterprises.....	¹ \$72,580,030	² \$19,181,610	\$53,398,420	278.3
Average per acre.....	³ \$20.05	⁴ \$13.27	(⁵)	.....
Estimated final cost of existing enterprises.....	\$84,392,344	(⁶)	.....	.....
Average per acre included in projects.....	\$15.37	(⁶)	.....	.....
Operation and maintenance:				
Acreage for which cost is reported.....	\$1,368,247	(⁶)	.....	.....
Total cost reported.....	⁷ \$2,109,431	(⁶)	.....	.....
Average cost per acre.....	\$1.54	(⁶)	.....	.....

¹ Reported July 1.
² Cost of construction of systems operated in 1899, exclusive of those on Indian reservations.
³ Based on acreage enterprises were capable of irrigating in 1910.
⁴ Based on acreage irrigated in 1899, exclusive of 242 acres on Indian reservations.
⁵ Figures not comparable. (See explanation in text.)
⁶ Not reported.
⁷ For 1900.

The cost of irrigation systems shows the largest increase of any item included in the census of irrigation, 278.4 per cent. In the average cost per acre there was also a considerable increase. The average cost per acre shown for 1910 is based on the acreage to which enterprises were capable of supplying water in that year, but since the corresponding acreage for 1900 was not reported, the figure for average cost at the earlier census is based on the acreage irrigated in 1899, and consequently is not comparable with the figure for the last census. If computed on the basis of the acreage irrigated in 1909, the average cost per acre in 1910 would be \$27.24, representing an increase of 105.3 per cent over the figure for the average cost at the census of 1900. The largely increased cost of irrigation enterprises is due in a considerable measure to the expensive equipment installed to secure a water supply and protect it from loss by seepage and evaporation, in sections where water is scarce and crop values are high. Furthermore, a number of large enterprises are under construction upon which considerable expenditures have been made, but which are

irrigating little land as yet, making the average cost reported higher than the true average. The average based on the estimated final cost and the acreage included in projects, \$15.37 per acre, probably more truly represents the average cost per acre of irrigation in California.

The county showing the lowest average cost per acre enterprises were capable of irrigating in 1910, \$1.29, is Mono, where much of the irrigated land consists of flooded pastures. The highest average cost per acre, \$368.40, is in Nevada County, where the unusual cost is due to the fact that many of the ditches now used for irrigation were originally constructed at heavy expense for mining purposes.

The acreage for which cost of operation and maintenance in 1909 was reported forms 51.4 per cent of the total acreage reported as irrigated in 1909, and 80.3 per cent of the acreage reported as irrigated by other than individual and partnership enterprises. The cost reported can be said, therefore, to represent fairly the average annual expense for all but individual and partnership enterprises.

CROPS.

As previously stated, the data relating to irrigated crops are taken from supplemental schedules filled out by the regular census enumerators. Since the special agents found enterprises which the enumerators had not reported, it is evident that the information relating to irrigated crops is incomplete to some extent. It shows, however, the relative importance of the dif-

ferent irrigated crops, and is sufficiently complete to afford reliable averages of yields and for comparison with totals for the state.

The following table shows the acreage, yield, and value of the principal crops reported as grown under irrigation in 1909, in comparison with totals for the same crops reported for the entire state:

CROP.	ACREAGE.			YIELD.			VALUE.	
	Total for state.	Irrigated.		Unit.	Total for state.	On irrigated land.	Total for state.	For irrigated land.
		Amount.	Per cent of total.					
Cereals:								
Corn.....	51,935	17,802	34.3	Bushels.....	1,273,901	401,078	\$1,077,411	\$440,312
Oats.....	192,158	5,003	3.1	Bushels.....	4,143,688	205,727	2,637,047	137,160
Wheat.....	478,217	22,603	4.7	Bushels.....	6,203,206	408,700	6,323,983	428,668
Barley.....	1,195,158	77,785	6.5	Bushels.....	26,441,954	1,844,071	17,184,508	1,097,541
Rye.....	7,027	107	1.5	Bushels.....	70,683	1,265	65,846	1,133
Other grains and seeds:								
Alfalfa seed.....	8,761	2,570	29.3	Bushels.....	23,791	5,011	200,823	53,329
Dry edible beans.....	157,987	11,384	7.2	Bushels.....	3,328,218	244,624	6,295,457	378,770
Dry peas.....	2,959	200	0.8	Bushels.....	57,468	9,902	101,016	15,331
Hay and forage:								
Timothy alone.....	13,725	8,026	58.5	Tons.....	20,001	11,236	185,579	90,083
Timothy and clover mixed.....	46,061	20,880	44.7	Tons.....	73,183	34,177	629,575	316,993
Clover alone.....	8,519	1,176	13.8	Tons.....	20,380	2,680	213,280	40,429
Alfalfa.....	484,134	360,092	75.7	Tons.....	1,630,707	1,280,105	13,088,530	9,983,370
Other tame or cultivated grasses ¹	92,556	6,504	7.0	Tons.....	122,103	10,656	1,280,011	112,097
Wild, salt, or prairie grasses.....	253,127	153,072	60.7	Tons.....	281,033	189,064	2,028,404	1,194,716
Grains cut green.....	1,604,745	101,187	6.3	Tons.....	2,010,526	146,013	24,056,727	1,532,681
Coarse forage.....	25,868	7,593	29.4	Tons.....	60,611	19,151	438,005	152,542
Sundry crops:								
Potatoes.....	67,688	32,735	48.4	Bushels.....	9,824,005	5,180,006	4,879,449	2,440,931
Sugar beets.....	² 78,671	14,657	18.6	Tons.....	² 843,269	171,494	² 4,313,981	839,561
Orchard fruits.....	(³)	73,401					² 18,358,897	6,397,138
Small fruits.....	² 6,687	6,876					² 1,789,214	1,585,808
Tropical fruits.....	(³)	98,099	71.0				² 16,752,102	15,269,911
Nuts.....	(³)	22,420					² 2,959,845	1,637,741
Grapes.....	(³)	74,034					² 10,846,812	3,038,435

¹ Includes millet or Hungarian grass.

² Preliminary tabulation, subject to correction.

³ Agriculture returns show number of trees and vines, and not acreage.

Although considerable quantities of other crops are grown both on irrigated and unirrigated land, the leading crops of the state, as well as the leading crops grown under irrigation, are represented in the table. In the reports of the agricultural census the acreages of seed crops are not usually given, but since the growing of alfalfa seed is coming to be an important industry in the irrigated sections of the country, statistics for this crop are given in the preceding table.

Acreage.—Of the entire acreage of the crops for which totals are presented in the table, slightly less than one-fifth is irrigated, the proportion irrigated varying widely for the different crops.

The cereals are very generally grown without irrigation, only 6.5 per cent of the total acreage of the cereal crops given in the table being irrigated. The highest percentage of acreage irrigated shown for any cereal, 34.3, is reported for corn, and the next highest, 6.5, for barley. The proportions for wheat and oats are, respectively, 4.7 and 3.1 per cent.

The hay and forage crops are more generally irrigated than the cereals, the irrigated acreage forming 26.3 per cent of the total reported for these crops. In the case of three of the eight hay and forage crops included in the table more than half of the total acreage is irrigated. For alfalfa the proportion is 75.7 per cent, for "wild, salt, or prairie grasses" 60.7 per cent, and for "timothy alone" 58.5 per cent.

Of the entire acreage in potatoes 48.4 per cent was irrigated in 1909 and of that in small fruits 71 per cent. Sugar beets are grown for the most part without irrigation in California, only 18.6 per cent of the total acreage of the crop being irrigated. The relative importance of the irrigated acreage in orchard and tropical fruits can not be determined, because the total acreage devoted to such fruits was not reported. It will be observed, however, that more than one-third of the value of all orchard fruits produced in the state and more than nine-tenths of the value of all tropical fruits produced represent the value of products grown on irrigated land. The value of the nuts grown on irrigated land forms 55.3 per cent of that of the total crop and the value of grapes from irrigated land 28 per cent of that of all grapes grown.

Of the crops shown in the table, alfalfa has the largest irrigated acreage, such acreage representing 32.5 per cent of the total irrigated area of the crops given. "Wild, salt, or prairie grasses" are next, with 13.6 per cent of this total, followed by grains cut green, with 9 per cent; tropical fruits, with 8.8 per cent; barley, with 6.9 per cent; grapes, with 6.6 per cent, and orchard fruits, with 6.5 per cent. No other single crop occupies as much as 3 per cent of the total acreage of the irrigated crops presented in the table. It will be observed, however, that, in point of value, the alfalfa crop is exceeded by that of tropical fruits, which contributed 32.4 per cent of the total value of irrigated crops, as against 21.2 per cent for alfalfa.

While many of the crops irrigated are well distributed geographically, there is a tendency toward the concentration of certain crops in particular localities. This is shown by the following statement, which gives the counties having the largest acreages of the principal irrigated crops, with the proportions which each contains of the total irrigated acreages of these crops in the state.

Corn.—Kern County, 29.4 per cent; Los Angeles, 13.4 per cent; Inyo, 10.5 per cent; Tulare, 7.9 per cent.

Oats.—Plumas County, 29 per cent; Lassen, 11.3 per cent; Siskiyou, 10.9 per cent; Inyo, 8.7 per cent.

Wheat.—Kern County, 20 per cent; Tulare, 17.9 per cent; Kings, 15.1 per cent; Lassen, 12.5 per cent.

Barley.—Imperial County, 43.9 per cent; Kings, 15.4 per cent; Kern, 8.2 per cent; Merced, 7.6 per cent.

Alfalfa seed.—Kings County, 47.7 per cent; Fresno, 17.6 per cent; Lassen, 10.8 per cent; Kern, 9.4 per cent.

Dry edible beans.—San Joaquin County, 64.2 per cent; Orange, 13.1 per cent; Ventura, 6.4 per cent; Contra Costa, 5.2 per cent.

Timothy alone.—Shasta County, 30.7 per cent; Plumas, 19.5 per cent; Modoc, 14.1 per cent; Siskiyou, 11.5 per cent.

Timothy and clover mixed.—Siskiyou County, 30.1 per cent; Lassen, 16.7 per cent; Plumas, 15.3 per cent; Shasta, 8.2 per cent.

Clover alone.—Nevada County, 18.3 per cent; Shasta, 16.1 per cent; Eldorado, 15.1 per cent; Yuba, 11.7 per cent.

Alfalfa.—Fresno County, 11.7 per cent; Stanislaus, 10.8 per cent; Merced, 10.3 per cent; Kings, 8.5 per cent.

"Other tame or cultivated grasses."—Siskiyou County, 26.4 per cent; Sierra, 20.5 per cent; Modoc, 10.3 per cent; Nevada, 8.9 per cent.

"Wild, salt, or prairie grasses."—Modoc County, 33 per cent; Lassen, 24 per cent; Plumas, 12.1 per cent; Sierra, 8 per cent.

Grains cut green.—Fresno County, 22.3 per cent; Imperial, 20.5 per cent; Kern, 11.9 per cent; Kings, 10.2 per cent.

Coarse forage.—Tulare County, 33.8 per cent; Fresno, 15.8 per cent; Imperial, 12.3 per cent; Los Angeles, 10.6 per cent.

Potatoes.—San Joaquin County, 48 per cent; Contra Costa, 20 per cent; Los Angeles, 9.3 per cent; Orange, 4.5 per cent.

Sugar beets.—Monterey County, 34.3 per cent; Los Angeles, 30.6 per cent; Santa Barbara, 13.5 per cent; Orange, 8.7 per cent.

Orchard fruits.—Fresno County, 31.9 per cent; Placer, 14.8 per cent; Tulare, 8.4 per cent; Santa Clara, 6.5 per cent.

Small fruits.—Los Angeles County, 30.4 per cent; Santa Clara, 13.9 per cent; Sacramento, 10.9 per cent; Santa Cruz, 7.2 per cent.

Tropical fruits.—San Bernardino County, 25.6 per cent; Los Angeles, 24.8 per cent; Riverside, 14.2 per cent; Tulare, 11.6 per cent.

Nuts.—Orange County, 46 per cent; Los Angeles, 34.7 per cent; Ventura, 12.1 per cent.

Grapes.—Fresno County, 62.6 per cent; Tulare, 12.2 per cent; Kings, 6.2 per cent; Sacramento, 5.7 per cent.

Of the total irrigated acreage of fruit trees and vines not bearing in 1909, amounting to 59,031, 36.1 per cent was in Fresno County, 14 per cent in Tulare County, 8 per cent in Orange County, and 7.2 per cent in Los Angeles County.

Yield.—In the table following the average yields per acre of crops extensively grown, both with and without irrigation, are shown. The yields on unirrigated land are obtained by subtracting the totals for irrigated crops from the totals for the state.

For all the crops given in the table, except alfalfa seed, "timothy alone," and "clover alone," there were greater average yields in 1909 on irrigated than on unirrigated land. The relative excess is greatest in the case of oats, 65.4 per cent, and next greatest in the case of wheat, 42.5 per cent.

For the cereals there was in every case an excess in the average yield under irrigation over that without irrigation, this excess ranging from 7.7 to 65.4 per cent. In the case of six of the hay and forage crops the average yield on irrigated land was greater than that on unirrigated land, the differences varying from 8.6 to 34.8 per cent, but for two a greater average yield on unirrigated land was reported. Comparisons can not be made for fruits, for the reason that the agricultural

returns do not give the total acreage devoted to these crops

CROP.	AVERAGE YIELD PER ACRE.		
	On unirrigated land.	On irrigated land.	
		Amount.	Per cent of excess over yield on unirrigated land. ¹
Corn..... bushels..	22.9	27.6	20.5
Oats..... bushels..	21.1	34.9	65.4
Wheat..... bushels..	12.7	18.1	42.5
Barley..... bushels..	22.0	23.7	7.7
Alfalfa seed..... bushels..	2.9	2.3	-20.7
Dry edible beans..... bushels..	21.0	21.5	2.4
Timothy alone..... tons..	1.54	1.40	-9.1
Timothy and clover mixed..... tons..	1.51	1.64	8.6
Clover alone..... tons..	2.41	2.20	-8.7
Alfalfa..... tons..	3.06	3.49	14.1
Other tame or cultivated grasses..... tons..	1.30	1.64	26.2
Wild, salt, or prairie grasses..... tons..	0.92	1.24	34.8
Grains cut green..... tons..	1.25	1.44	15.2
Coarse forage..... tons..	2.27	2.52	11.0
Potatoes..... bushels..	132.9	158.2	19.0
Sugar beets..... tons..	10.40	11.70	11.5

¹ A minus sign (-) indicates that the yield on irrigated land is less than that on unirrigated land.

In considering these comparisons it should be borne in mind that they are not comparisons of yields on irrigated and on unirrigated land in the same localities, but of yields under irrigation in localities where crops can not be grown to advantage without it with yields in localities where irrigation is not necessary. They do not indicate, therefore, the relative advantages of farming with and without irrigation in a given community, but rather give one factor for determining the relative advantages of farming where irrigation is necessary and where it is not necessary for the successful growing of crops.

COUNTY TABLE.

The next table gives in detail, by counties, the data summarized above, except those relating to crops. For purposes of comparison the total number of farms in the state, the approximate land area of the state, the total land in farms, and the improved land in farms have been included in the table.

Certain irrigation enterprises extend into more than one county, and in the case of some of these enterprises the reports do not segregate the data by counties. In such cases a distribution has been made according to the best estimates possible from all the information in the possession of the bureau. It is believed that these estimates are approximately correct.

The number of farms irrigated in 1909 includes 350 farms in Contra Costa, Del Norte, Humboldt, Marin, Mendocino, Napa, San Francisco, San Mateo, Santa Cruz, Sonoma, and Sutter Counties, shown under "all other counties" in Twelfth Census report, and 64 farms on Indian reservations.

The acreage irrigated in 1909 includes 3,834 acres in Contra Costa, Del Norte, Humboldt, Marin, Mendocino, Napa, San Francisco, San Mateo, Santa Cruz,

Sonoma, and Sutter Counties, shown under "all other counties" in Twelfth Census report, and 242 acres on Indian reservations.

The figures for number and length of main ditches for 1899 relate only to main ditches, outside of Indian reservations, receiving water by gravity from streams, lakes, and springs in 1899 and used chiefly or solely for irrigation purposes.

Figures for cost in 1899 are exclusive of Indian reservations.

Change of boundaries.—In comparing the data secured for 1910 with those from the census of 1900, the following changes in county boundaries should be considered: (1) The organization of Imperial County from a part of San Diego County in 1907; and (2) the annexation of a part of Fresno County to Kings County in 1909.

Land in farms in Sutter County.—In accordance with instructions to assign all of the acreage of a farm to the county in which the residence of the operator was located, a large acreage in adjoining counties has been tabulated as in Sutter County.

IRRIGATION—CALIFORNIA.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910.

(Comparative data for 1899 in italics.)

		THE STATE.	Alameda.	Alpine.	Amador.	Butte.	Calaveras.	Colusa.	Contra Costa.	Feldorado.
1	Number of all farms in 1910.....	1 88,197	2,422	42	537	1,500	632	667	1,465	716
2	Number of farms irrigated in 1909.....	39,352	50	32	73	556	154	112	78	244
3	Per cent of all farms.....	44.6	2.1	76.2	13.6	37.1	24.4	16.8	5.3	34.1
4	Number of farms irrigated in 1899.....	<i>25,675</i>	<i>101</i>	<i>33</i>	<i>137</i>	<i>455</i>	<i>143</i>	<i>62</i>	(⁸)	<i>205</i>
5	Per cent of increase, 1899-1909.....	53.3	4 50.5	4 3.0	4 46.7	22.2	7.7	80.6		4 17.3
LAND AND FARM AREA										
6	Approximate land area..... acres.	1 99,617,280	468,480	496,640	384,640	1,102,080	657,280	720,600	456,960	1,121,920
7	Land in farms..... acres.	<i>1 37,931,444</i>	<i>311,327</i>	<i>32,004</i>	<i>201,730</i>	<i>490,777</i>	<i>271,401</i>	<i>522,376</i>	<i>406,433</i>	<i>210,881</i>
8	Improved land in farms..... acres.	<i>1 11,389,894</i>	<i>177,314</i>	<i>7,379</i>	<i>46,969</i>	<i>247,097</i>	<i>60,104</i>	<i>336,509</i>	<i>262,152</i>	<i>41,682</i>
9	Acres irrigated in 1909.....	2,604,104	1,850	3,349	826	28,754	1,275	4,276	26,856	5,122
10	Per cent of total land area.....	2.7	0.4	0.7	0.2	2.6	0.2	0.6	5.9	0.5
11	Per cent of land in farms.....	9.5	0.6	10.5	0.3	5.9	0.5	0.8	6.6	2.4
12	Per cent of improved land in farms.....	23.4	1.0	44.2	1.8	11.6	2.2	1.3	10.2	12.3
13	Acres irrigated in 1899.....	<i>2 1,446,114</i>	<i>2,532</i>	<i>4,301</i>	<i>1,167</i>	<i>7,332</i>	<i>1,476</i>	<i>2,996</i>	(³)	<i>3,337</i>
14	Per cent of increase, 1899-1909.....	84.2	4 26.6	4 23.7	4 28.2	292.2	4 13.6	42.8		51.2
15	Acres enterprises were capable of irrigating in 1910.....	3,619,378	1,872	3,399	3,973	115,075	3,161	16,541	32,562	5,501
16	Acres included in projects.....	5,490,360	2,605	3,435	4,139	233,500	3,919	18,783	32,640	20,264
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17	U. S. Reclamation Service, irrigated in 1909.....	400								
18	Enterprises were capable of irrigating in 1910.....	1,200								
19	Included in projects.....	14,200								
20	U. S. Indian Service, irrigated in 1909.....	3,490								
21	Enterprises were capable of irrigating in 1910.....	3,490								
22	Included in projects.....	3,800								
23	Carey Act enterprises, irrigated in 1909.....									
24	Enterprises were capable of irrigating in 1910.....									
25	Included in projects.....									
26	Irrigation districts, irrigated in 1909.....	173,793								
27	Enterprises were capable of irrigating in 1910.....	294,108								
28	Included in projects.....	606,351								
29	Cooperative enterprises, irrigated in 1909.....	779,020						875		200
30	Enterprises were capable of irrigating in 1910.....	984,570						2,500		480
31	Included in projects.....	1,388,435						3,450		480
32	Commercial enterprises, irrigated in 1909.....	746,265			360	24,930	180	1,000		3,661
33	Enterprises were capable of irrigating in 1910.....	1,204,050			3,500	110,200	1,300	1,000		3,661
34	Included in projects.....	1,965,093			3,500	221,450	1,700	2,000		17,801
35	Individual and partnership enterprises, irrigated in 1909.....	961,136	1,859	3,349	466	3,824	1,085	2,401	26,856	1,261
36	Enterprises were capable of irrigating in 1910.....	1,131,951	1,872	3,399	473	4,875	1,861	13,041	32,562	1,360
37	Included in projects.....	1,512,511	2,605	3,435	639	12,050	2,219	13,333	32,640	1,983
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38	Supplied from streams.....	2,246,722	651	3,194	781	27,803	906	4,258	26,504	3,557
39	By gravity.....	2,216,757	546	3,194	779	27,771	893	3,313	20,818	3,557
40	By pumping.....	29,965	105		2	32	13	940	5,686	
41	Supplied from lakes.....	18,470		115						1,500
42	By gravity.....	15,896		115						1,500
43	By pumping.....	2,574								
44	Supplied from wells.....	350,723	1,125			046	52	11	267	
45	Flowing.....	74,128					4		30	
46	By pumping.....	276,595	1,125			046	48	11	237	
47	Supplied from springs.....	31,770		40	45	305	247	7	85	65
48	Supplied from reservoirs.....	16,410	83				70			
49	Total acres supplied by pumping.....	309,134	1,230		2	678	61	951	5,923	
IRRIGATION ENTERPRISES										
50	Independent enterprises..... number.....	13,970	53	21	40	144	150	45	185	50
51	Number in 1899.....									
52	Per cent of increase, 1899-1910.....									
53	Main ditches..... number.....	8,590	49	25	55	135	148	38	176	56
54	Number in 1899.....	<i>1,913</i>								
55	Per cent of increase, 1899-1910.....									
56	Length..... miles.....	12,620	21	34	185	270	124	44	172	285
57	Length in 1899..... miles.....	<i>5,100</i>								
58	Per cent of increase, 1899-1910.....									
59	Capacity..... cubic feet per second.....	89,597	605	179	255	2,028	206	531	60	445
60	Laterals..... number.....	6,143		3	12	145	32	10		25
61	Length..... miles.....	8,509		1	56	170	31	7		55
62	Reservoirs..... number.....	1,583	52		14	27	29		1	22
63	Capacity..... acre-feet.....	743,269	3		309	360	12,029		1	711
64	Flowing wells..... number.....	2,361					6		1	
65	Capacity..... gallons per minute.....	477,343					40		143	
66	Pumped wells..... number.....	10,724	56			46	7	3		23
67	Capacity..... gallons per minute.....	4,119,575	3,740			20,680	844	977	1,339	
68	Pumping plants..... number.....	9,297	57		1	46	9	12		30
69	Engine capacity..... horsepower.....	128,143	384		5	555	44	516	751	
70	Pump capacity..... gallons per minute.....	5,276,298	5,019		100	32,391	1,094	51,365	138,947	
COST										
71	Cost of enterprises up to July 1, 1910..... dollars.....	72,580,030	57,156	7,493	265,608	1,231,894	121,033	76,112	90,503	346,939
72	Cost in 1899..... dollars.....	<i>19,181,610</i>								
73	Per cent of increase, 1899-1910.....	278.4								
74	Average cost per acre enterprises were capable of irrigating in 1910..... dollars.....	20.05	30.53	2.20	66.85	10.71	38.29	4.60	2.78	63.07
75	Average cost per acre irrigated in 1899..... dollars.....	<i>13.27</i>								
76	Estimated final cost of existing enterprises..... dollars.....	84,392,344	57,156	7,493	265,608	1,331,894	121,033	76,112	90,503	346,939
77	Average per acre included in projects..... dollars.....	15.37	21.94	2.18	64.17	5.92	30.88	4.05	2.77	17.12
OPERATION AND MAINTENANCE										
78	Acres for which cost is reported.....	1,368,247			360	24,380	140	800		3,590
79	Total cost reported..... dollars.....	2,109,431			8,505	28,546	918	4,055		16,325
80	Average per acre for which cost is reported..... dollars.....	1.54			23.63	1.17	6.56	5.07		4.55
81	Average cost per acre in 1899..... dollars.....									
82	Per cent of increase, 1899-1909.....									

¹ Includes figures for Del Norte County, from which no irrigation is reported at the census of 1910.
² Includes figures shown under "all other counties" in Twelfth Census report, and for Indian reservations. (See explanation at close of text.)

³ Included in "all other counties" in Twelfth Census report.
⁴ Decrease.
⁵ Not reported.
⁶ Not reported by counties. (See explanation at close of text.)

IRRIGATION—CALIFORNIA.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND

[Comparative data for 1899 in italics.]

	Fresno. ¹	Glenn.	Humboldt.	Imperial.	Inyo.	Kern.	Kings. ¹	Lake.	Lassen.
1 Number of all farms in 1910.....	6,245	663	1,534	1,322	438	1,107	1,837	603	502
2 Number of farms irrigated in 1909.....	6,310	196	33	1,250	408	870	1,120	43	355
3 Per cent of all farms.....	85.0	29.6	2.2	94.6	93.2	75.1	61.3	7.1	70.7
4 Number of farms irrigated in 1899.....	2,459	67	(*)	(†)	562	653	780	45	313
5 Per cent of increase, 1899-1909.....		192.5			12.7	34.2		4.4	13.4
LAND AND FARM AREA									
6 Approximate land area.....acres.	3,808,000	805,700	2,325,760	2,616,960	6,412,160	5,121,920	741,760	817,920	2,899,840
7 Land in farms.....acres.	1,106,616	491,198	642,536	223,402	110,142	1,403,350	373,823	217,464	295,728
8 Improved land in farms.....acres.	590,205	309,765	105,248	176,069	38,698	315,387	196,509	42,708	122,057
9 Acreage irrigated in 1909.....	402,318	5,661	208	100,711	65,163	100,034	190,949	582	77,079
10 Per cent of total land area.....	10.6	0.7	(‡)	3.8	1.0	3.7	25.7	0.1	2.7
11 Per cent of land in farms.....	36.4	1.2	(‡)	85.3	59.2	51.1	31.1	0.3	26.1
12 Per cent of improved land in farms.....	68.2	1.8	0.2	6108.3	6108.4	60.3	97.1	1.4	63.2
13 Acreage irrigated in 1899.....	288,737	1,382	(‡)	(‡)	41,026	112,533	92,794	533	49,634
14 Per cent of increase, 1899-1909.....		309.6			58.8	68.0		11.3	55.3
15 Acreage enterprises were capable of irrigating in 1910.....	560,326	16,804	333	242,000	71,815	217,418	280,523	828	80,815
16 Acreage included in projects.....	633,652	220,664	966	375,000	92,319	402,806	310,523	1,268	149,530
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS									
CLASSIFIED BY CHARACTER OF ENTERPRISE.									
17 U. S. Reclamation Service, irrigated in 1909.....		400							
18 Enterprises were capable of irrigating in 1910.....		1,200							
19 Included in projects.....		14,200							
20 U. S. Indian Service, irrigated in 1909.....									
21 Enterprises were capable of irrigating in 1910.....									
22 Included in projects.....									
23 Carey Act enterprises, irrigated in 1909.....									
24 Enterprises were capable of irrigating in 1910.....									
25 Included in projects.....									
26 Irrigation districts, irrigated in 1909.....	9,329						925		
27 Enterprises were capable of irrigating in 1910.....	21,335						2,785		
28 Included in projects.....	21,335						2,785		
29 Cooperative enterprises, irrigated in 1909.....	52,017			100,711	25,400	6,720	136,480		2,740
30 Enterprises were capable of irrigating in 1910.....	71,492			242,000	27,200	9,020	170,480		5,080
31 Included in projects.....	88,498			375,000	37,700	13,800	177,020		7,200
32 Commercial enterprises, irrigated in 1909.....	304,528	2,500				111,580	34,032		6,200
33 Enterprises were capable of irrigating in 1910.....	417,379	9,000				129,200	93,781		15,000
34 Included in projects.....	452,809	108,000				275,008	93,781		52,000
35 Individual and partnership enterprises, irrigated in 1909.....	36,444	2,761	208		39,763	71,734	19,512	582	68,139
36 Enterprises were capable of irrigating in 1910.....	50,120	6,694	333		44,015	79,138	22,477	828	69,735
37 Included in projects.....	71,010	8,464	966		54,610	113,938	36,937	1,268	90,330
ACREAGE IRRIGATED									
CLASSIFIED BY SOURCE OF WATER SUPPLY.									
38 Supplied from streams.....	380,109	5,463	179	190,711	62,402	183,112	178,187	350	62,342
39 By gravity.....	378,472	4,282	179	190,711	62,402	183,112	178,187	301	62,322
40 By pumping.....	1,037	1,181						58	20
41 Supplied from lakes.....	480					4	320		720
42 By gravity.....							320		
43 By pumping.....	480					4			720
44 Supplied from wells.....	21,720	198	11		141	6,387	12,442	10	
45 Flowing.....					141	2,097	11,400	2	
46 By pumping.....	21,720	198	11			4,290	1,042	8	
47 Supplied from springs.....			18		1,620	531		213	4,002
48 Supplied from reservoirs.....					1,000				10,015
49 Total acreage supplied by pumping.....	23,846	1,379	11			4,204	1,042	66	740
IRRIGATION ENTERPRISES									
50 Independent enterprises.....number.....	975	116	33	9	188	244	77	43	233
51 Number in 1899.....									
52 Per cent of increase, 1899-1910.....									
53 Main ditches.....number.....	254	50	33	12	184	178	27	44	205
54 Number in 1899.....									
55 Per cent of increase, 1899-1910.....									
56 Length.....miles.....	831	136	26	117	396	441	137	26	368
57 Length in 1899.....									
58 Per cent of increase, 1899-1910.....									
59 Capacity.....cubic feet per second.....	6,299	1,659	145	3,250	2,752	9,990	4,840	90	2,248
60 Laterals.....number.....	688	554	4	179	326	118	51	21	263
61 Length.....miles.....	1,384	1,073	2	890	168	257	159	2	146
62 Reservoirs.....number.....	8	12	5		1	51	37	3	29
63 Capacity.....acre-feet.....	402	45,009	7		11,300	1,601	111	2	169,552
64 Flowing wells.....number.....	3				10	25	75	1	
65 Capacity.....gallons per minute.....	450				500	12,283	19,436	75	
66 Pumped wells.....number.....	855	105	2		1	140	20	3	
67 Capacity.....gallons per minute.....	443,024	26,484	105		100	90,018	8,700	272	
68 Pumping plants.....number.....	888	77	1		1	114	18	11	2
69 Engine capacity.....horsepower.....	8,990	896	3		5	2,846	174	49	90
70 Pump capacity.....gallons per minute.....	515,380	62,449	105		100	90,068	12,739	4,577	6,100
COST									
71 Cost of enterprises up to July 1, 1910.....dollars.....	1,898,460	1,510,561	20,027	4,955,272	962,698	1,788,635	687,381	12,124	884,965
72 Cost in 1899.....									
73 Per cent of increase, 1899-1910.....									
74 Average cost per acre enterprises were capable of irrigating in 1910.....dollars.....	3.39	90.43	87.17	20.48	13.41	8.23	2.37	14.64	9.85
75 Average cost per acre irrigated in 1899.....									
76 Estimated final cost of existing enterprises.....dollars.....	1,898,460	3,716,976	20,027	5,884,182	962,698	1,788,635	687,381	12,124	1,034,965
77 Average per acre included in projects.....dollars.....	3.00	16.84	30.05	15.69	10.43	4.44	2.21	0.56	6.92
OPERATION AND MAINTENANCE									
78 Acreage for which cost is reported.....	352,569			190,711	25,400	4,080	156,100		6,920
79 Total cost reported.....dollars.....	56,172			393,724	9,046	5,533	40,800		18,450
80 Average per acre for which cost is reported.....dollars.....	0.16			2.06	0.39	1.36	0.26		2.67
81 Average cost per acre in 1899.....									
82 Per cent of increase, 1899-1909.....									

¹ Change of boundary. (See explanation at close of text.) ² Included in "all other counties" in Twelfth Census report. ³ Decrease. ⁴ Less than one-tenth of 1 per cent.

IRRIGATION—CALIFORNIA.

COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910—Continued.

[Comparative data for 1899 in italics.]

	Los Angeles.	Madera.	Marin.	Mariposa.	Mendocino.	Merced.	Modoc.	Mono.	Monterey.	Napa.	
1	Number of all farms in 1910.....	7,019	573	498	330	1,356	1,850	736	91	1,658	1,537
2	Number of farms irrigated in 1909.....	4,669	158	6	56	39	1,417	487	76	268	36
3	Per cent of all farms.....	59.0	27.6	1.2	17.0	2.9	76.3	59.4	83.5	15.6	2.3
4	Number of farms irrigated in 1899.....	<i>4,006</i>	<i>120</i>	(²)	<i>66</i>	(²)	<i>620</i>	<i>407</i>	<i>97</i>	<i>88</i>	(²)
5	Per cent of increase, 1899-1909.....	14.8	31.7		² 15.2		172.5	² 6.4	² 21.6	193.2	
LAND AND FARM AREA											
6	Approximate land area..... acres.....	2,602,880	1,351,680	338,500	936,320	2,209,920	1,276,800	2,446,720	1,939,200	2,131,200	501,120
7	Land in farms..... acres.....	757,685	620,663	263,442	206,059	721,325	1,102,167	410,134	115,072	1,147,416	360,580
8	Improved land in farms..... acres.....	418,998	391,086	93,115	37,017	82,578	607,742	164,784	43,382	371,508	101,114
9	Acreage irrigated in 1909.....	145,586	38,705	67	370	371	151,998	82,075	49,027	15,056	1,191
10	Per cent of total land area.....	5.6	2.9	(⁴)	(⁴)	(⁴)	11.9	3.4	2.5	0.7	0.2
11	Per cent of land in farms.....	19.2	6.2	(⁴)	0.2	0.1	13.1	4.2	4.2	1.3	0.3
12	Per cent of improved land in farms.....	34.7	9.9	0.1	1.0	0.4	25.0	49.8	6 113.0	4.1	1.2
13	Acreage irrigated in 1899.....	<i>85,644</i>	<i>23,152</i>	(²)	<i>574</i>	(²)	<i>111,330</i>	<i>78,010</i>	<i>59,203</i>	<i>6,675</i>	(²)
14	Per cent of increase, 1899-1909.....	70.0	67.2		² 34.5		39.5	5.2	² 17.2	125.6	
15	Acreage enterprises were capable of irrigating in 1910.....	183,506	51,230	71	546	590	248,670	89,476	50,007	27,176	2,035
16	Acreage included in projects.....	241,794	82,321	71	767	1,365	281,710	124,166	84,973	29,914	2,443
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS											
CLASSIFIED BY CHARACTER OF ENTERPRISE.											
17	U. S. Reclamation Service, irrigated in 1909										
18	Enterprises were capable of irrigating in 1910.....										
19	Included in projects.....										
20	U. S. Indian Service, irrigated in 1909										
21	Enterprises were capable of irrigating in 1910.....										
22	Included in projects.....										
23	Carey Act enterprises, irrigated in 1909										
24	Enterprises were capable of irrigating in 1910.....										
25	Included in projects.....										
26	Irrigation districts, irrigated in 1909	850					8,200				
27	Enterprises were capable of irrigating in 1910.....	850					15,917				
28	Included in projects.....	850					19,980				
29	Cooperative enterprises, irrigated in 1909	64,068	8,696				860	2,190		5,773	
30	Enterprises were capable of irrigating in 1910.....	75,196	16,000				1,110	2,500		9,288	
31	Included in projects.....	84,538	16,000				1,110	3,000		9,350	
32	Commercial enterprises, irrigated in 1909	5,267				29	134,228	8,850		5,000	
33	Enterprises were capable of irrigating in 1910.....	16,757				60	221,428	9,650		9,500	
34	Included in projects.....	40,757				60	248,765	12,150		9,500	
35	Individual and partnership enterprises, irrigated in 1909	75,401	30,009	67	376	342	8,710	71,035	49,027	4,283	1,191
36	Enterprises were capable of irrigating in 1910.....	90,703	35,230	71	546	530	10,215	77,476	50,007	8,888	2,035
37	Included in projects.....	115,649	66,321	71	767	1,305	11,864	109,016	84,973	11,064	2,443
ACREAGE IRRIGATED											
CLASSIFIED BY SOURCE OF WATER SUPPLY.											
38	Supplied from streams.....	46,754	37,042	64	324	278	149,714	69,164	46,142	10,003	1,070
39	By gravity.....	46,689	37,042		324	270	147,138	69,164	46,142	9,769	832
40	By pumping.....	65		64		8	2,576			334	238
41	Supplied from lakes.....							690	2,420	20	5
42	By gravity.....							690	2,420		5
43	By pumping.....									20	
44	Supplied from wells.....	97,318	1,663	3	6	29	2,264	308		4,428	7
45	Flowing.....	13,570					262	305			
46	By pumping.....	83,748	1,663	3	6	29	2,002	3		4,428	7
47	Supplied from springs.....	1,512			46	4	20	7,189	465	5	94
48	Supplied from reservoirs.....	2			60	60	4,724				15
49	Total acreage supplied by pumping.....	83,813	1,663	67	6	37	4,578	3		5,282	245
IRRIGATION ENTERPRISES											
50	Independent enterprises..... number.....	1,567	35	6	48	37	135	388	77	117	35
51	Number in 1899.....										
52	Per cent of increase, 1899-1910.....										
53	Main ditches..... number.....	601	34	5	49	33	45	446	85	106	26
54	Number in 1899.....										
55	Per cent of increase, 1899-1910.....										
56	Length..... miles.....	800	70	5	21	10	261	637	172	223	8
57	Length in 1899.....										
58	Per cent of increase, 1899-1910.....										
59	Capacity..... cubic feet per second.....	2,296	1,515	21	28	49	4,478	2,907	1,243	1,903	25
60	Laterals..... number.....	494	30			8	353	490	101	23	3
61	Length..... miles.....	500	294			6	352	175	65	32	3
62	Reservoirs..... number.....	279	3	1	8	7	10	32		10	3
63	Capacity..... acre-feet.....	993	12,341	1	3	10	15,003	33,993		2	13
64	Flowing wells..... number.....	376					29	45			
65	Capacity..... gallons per minute.....	70,818					2,567	1,256			2
66	Pumped wells..... number.....	1,673	33	1	2	6	78	2		102	2
67	Capacity..... gallons per minute.....	871,143	26,518	150	49	2,296	52,008	44		196,236	300
68	Pumping plants..... number.....	1,361	25	6	2	10	108	2		124	17
69	Engine capacity..... horsepower.....	30,632	604	48	1	65	1,505	2		5,338	115
70	Pump capacity..... gallons per minute.....	872,718	26,518	1,100	49	3,586	93,239	44		260,513	7,751
COST											
71	Cost of enterprises up to July 1, 1910..... dollars.....	7,817,023	512,098	3,380	13,440	30,297	3,748,211	301,040	64,282	495,916	53,948
72	Cost in 1899.....										
73	Per cent of increase, 1899-1910.....										
74	Average cost per acre enterprises were capable of irrigating in 1910..... dollars.....	42.60	10.00	47.61	24.02	51.35	15.07	3.36	1.29	18.25	26.51
75	Average cost per acre irrigated in 1899.....										
76	Estimated final cost of existing enterprises..... dollars.....	9,266,023	512,098	3,380	13,440	30,297	3,748,211	316,040	64,282	578,916	53,948
77	Average per acre included in projects..... dollars.....	38.32	6.22	47.61	17.52	22.20	13.30	2.55	0.76	19.35	22.98
OPERATION AND MAINTENANCE											
78	Acreage for which cost is reported.....	67,361	8,696				103,288	950		10,073	
79	Total cost reported..... dollars.....	357,967	5,175				94,228	259		12,916	
80	Average per acre for which cost is reported..... dollars.....	5.31	0.60				0.91	0.26		1.28	
81	Average cost per acre in 1899.....										
82	Per cent of increase, 1899-1909.....										

² Acreage irrigated includes wild grass land, while improved acreage does not.

⁶ Not reported.

⁷ Not reported by counties.

IRRIGATION—CALIFORNIA.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND

[Comparative data for 1899 in italics.]

	Nevada	Orange.	Placer.	Plumas.	River-side.	Sacra-mento.	San Benito.	San Bern-ardino.	San Diego. ¹	San Fran-cisco.
1 Number of all farms in 1910.....	544	3,165	1,062	221	2,683	1,601	921	2,049	2,298	157
2 Number of farms irrigated in 1909.....	300	2,215	618	151	2,174	1,053	240	2,463	890	25
3 Per cent of all farms.....	55.1	70.0	58.2	68.3	80.9	65.8	26.1	83.5	38.7	15.9
4 <i>Number of farms irrigated in 1899.....</i>	<i>283</i>	<i>1,558</i>	<i>518</i>	<i>187</i>	<i>1,737</i>	<i>485</i>	<i>106</i>	<i>1,854</i>	<i>1,041</i>	(?)
5 Per cent of increase, 1899-1909.....	6.0	42.2	19.3	³ 19.3	25.2	147.8	44.6	32.8		
LAND AND FARM AREA										
6 Approximate land area.....acres.....	623,360	508,800	892,800	1,600,160	4,633,600	629,120	890,880	12,000,480	2,701,440	27,520
7 Land in farms.....acres.....	175,398	371,692	248,080	134,259	520,806	473,044	544,301	208,396	834,426	2,091
8 Improved land in farms.....acres.....	24,542	189,463	98,608	54,281	278,151	275,682	186,573	136,625	234,945	1,562
9 Acreage irrigated in 1909.....	3,830	55,050	16,845	36,602	71,436	53,683	7,186	70,278	24,944	383
10 Per cent of total land area.....	0.6	10.8	1.9	2.2	1.5	8.5	0.8	0.5	0.9	1.4
11 Per cent of land in farms.....	2.2	14.8	6.8	27.3	13.7	11.3	1.3	33.7	3.0	18.3
12 Per cent of improved land in farms.....	15.6	29.1	17.1	67.4	25.7	19.5	3.9	51.4	10.7	24.5
13 <i>Acreage irrigated in 1899.....</i>	<i>4,003</i>	<i>41,549</i>	<i>10,308</i>	<i>28,483</i>	<i>32,247</i>	<i>12,409</i>	<i>2,870</i>	<i>37,377</i>	<i>16,022</i>	(?)
14 Per cent of increase, 1899-1909.....	³ 4.1	32.5	63.4	28.8	116.8	332.6	150.4	85.5	55.7	
15 Acreage enterprises were capable of irrigating in 1910.....	4,259	63,486	23,365	37,529	103,283	69,970	13,790	86,107	31,205	383
16 Acreage included in projects.....	5,287	71,444	61,751	37,901	210,452	74,588	20,067	152,415	45,535	383
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17 United States Reclamation Service, irrigated in 1909.....										
18 Enterprises were capable of irrigating in 1910.....										
19 Included in projects.....					600				2,890	
20 United States Indian Service, irrigated in 1909.....					600				2,890	
21 Enterprises were capable of irrigating in 1910.....					731				3,009	
22 Included in projects.....										
23 Carey Act enterprises, irrigated in 1909.....										
24 Enterprises were capable of irrigating in 1910.....										
25 Included in projects.....										
26 Irrigation districts, irrigated in 1909.....										
27 Enterprises were capable of irrigating in 1910.....										
28 Included in projects.....										
29 Cooperative enterprises, irrigated in 1909.....	85	30,528			44,464		765	49,200	2,640	
30 Enterprises were capable of irrigating in 1910.....	85	31,965			66,659		1,500	55,850	4,040	
31 Included in projects.....	85	38,425			154,011		1,500	62,704	5,660	
32 Commercial enterprises, irrigated in 1909.....	2,075		16,310		7,063	8,819	3,180	2,683	10,000	
33 Enterprises were capable of irrigating in 1910.....	2,109		22,667		11,813	22,162	8,000	2,883	11,000	
34 Included in projects.....	2,109		60,667		11,813	22,162	12,000	48,383	13,250	
35 Individual and partnership enterprises, irrigated in 1909.....	1,679	24,528	535	36,602	18,709	44,864	3,241	18,395	9,414	383
36 Enterprises were capable of irrigating in 1910.....	2,065	31,521	698	37,529	24,161	47,808	4,290	27,364	13,275	383
37 Included in projects.....	3,073	39,019	1,084	37,901	48,897	52,426	6,567	41,268	23,656	383
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38 Supplied from streams.....	3,662	28,373	16,780	35,279	29,686	44,285	4,425	42,634	19,839	
39 By gravity.....	3,047	26,263	16,781	35,279	29,445	42,388	4,374	42,168	19,532	
40 By pumping.....	15	110	49		241	1,897	51	466	307	
41 Supplied from lakes.....				320			100			
42 By gravity.....				320			100			
43 By pumping.....										
44 Supplied from wells.....	5	26,683	17	20	40,643	9,395	2,659	26,544	5,030	383
45 Flowing.....		6,528		20	20,806		847	3,374		
46 By pumping.....	5	20,157	17		19,837	9,395	1,812	23,170	5,030	383
47 Supplied from springs.....	172		48	983	1,107		2	1,100	75	
48 Supplied from reservoirs.....										
49 Total acreage supplied by pumping.....	20	20,267	66		20,078	11,295	1,863	23,636	5,337	383
IRRIGATION ENTERPRISES										
50 Independent enterprises.....number.....	103	619	35	127	610	880	109	521	384	30
51 <i>Number in 1899⁴.....</i>										
52 Per cent of increase, 1899-1910.....										
53 Main ditches.....number.....	110	309	35	147	301	213	64	291	288	24
54 <i>Number in 1899⁵.....</i>										
55 Per cent of increase, 1899-1910.....										
56 Length.....miles.....	236	180	194	201	500	238	61	466	259	7
57 <i>Length in 1899⁵.....</i>										
58 Per cent of increase, 1899-1910.....										
59 Capacity.....cubic feet per second.....	372	876	437	1,176	2,325	1,556	366	1,315	1,404	11
60 Laterals.....number.....	46	115	46	62	262	5	12	237	244	
61 Length.....miles.....	32	246	108	16	288	8	33	283	140	
62 Reservoirs.....number.....	24	19	29		131	2	6	83	68	27
63 Capacity.....acre-feet.....	26,438	189	53,354		58,440	352	5,302	96,969	26,845	2
64 Flowing wells.....number.....		588		3	553			79		
65 Capacity.....gallons per minute.....		92,689		504	90,331			21,825		
66 Pumped wells.....number.....	5	589	2		792	1,108	87	449	438	39
67 Capacity.....gallons per minute.....	48	260,947	289		239,472	260,303	25,822	209,747	110,807	4,444
68 Pumping plants.....number.....	4	433	5		405	1,192	54	402	363	39
69 Engine capacity.....horsepower.....	12	8,575	30		11,067	5,059	677	10,700	2,857	89
70 Pump capacity.....gallons per minute.....	848	286,003	1,284		346,788	335,636	29,452	233,136	112,256	4,444
COST										
71 Cost of enterprises up to July 1, 1910.....dollars.....	1,569,028	1,948,246	2,708,740	107,118	5,648,469	1,452,471	177,924	9,416,960	3,753,127	21,975
72 <i>Cost in 1899⁶.....</i>										
73 Per cent of increase, 1899-1910.....										
74 Average cost per acre enterprises were capable of irrigating in 1910.....dollars.....	368.40	30.69	119.78	2.85	54.72	20.76	12.90	109.36	120.27	57.38
75 <i>Average cost per acre irrigated in 1899⁶.....</i>										
76 Estimated final cost of existing enterprises.....dollars.....	1,569,028	1,948,246	2,708,740	107,118	5,693,469	1,452,471	267,924	13,038,449	3,767,127	21,975
77 Average per acre included in projects.....dollars.....	297.90	27.27	46.32	2.83	27.08	19.47	13.35	85.55	82.73	57.38
OPERATION AND MAINTENANCE										
78 Acreage for which cost is reported.....	804	29,239	16,310		51,419	7,220	3,665	33,973	12,640	
79 Total cost reported.....dollars.....	3,150	78,875	73,064		293,871	16,079	3,584	187,877	64,374	
80 Average per acre for which cost is reported.....dollars.....	3.92	2.70	4.48		5.72	2.22	0.98	5.53	5.09	
81 <i>Average cost per acre in 1899⁴.....</i>										
82 Per cent of increase, 1899-1909.....										

¹ Change of boundary. (See explanation at close of text.)

² Included in "all other counties" in Twelfth Census report.

IRRIGATION—CALIFORNIA.

COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910—Continued.

[Comparative data for 1899 in italics.]

	San Joaquin.	San Luis Obispo.	San Mateo.	Santa Barbara.	Santa Clara.	Santa Cruz.	Shasta.	Sierra.	Siskiyou.	Solano.
1 Number of all farms in 1910.....	3,286	1,714	665	1,355	4,731	1,466	1,010	110	1,114	1,143
2 Number of farms irrigated in 1909.....	1,452	91	75	137	1,101	106	639	94	636	150
3 Per cent of all farms.....	44.2	5.3	11.3	10.1	23.3	7.2	63.3	85.5	57.1	13.1
4 <i>Number of farms irrigated in 1899</i>	<i>414</i>	<i>78</i>	<i>(*)</i>	<i>182</i>	<i>1,189</i>	<i>(*)</i>	<i>680</i>	<i>98</i>	<i>594</i>	<i>29</i>
5 Per cent of increase, 1899-1909.....	250.7	16.7		24.7	2.5		6.9	4.1	7.1	417.2
LAND AND FARM AREA										
6 Approximate land area..... acres	926,720	2,133,760	286,080	1,753,600	849,920	278,400	2,409,120	590,720	4,003,840	526,080
7 Land in farms..... acres	763,048	1,588,600	160,655	1,120,475	784,819	167,308	389,213	84,220	455,876	474,866
8 Improved land in farms..... acres	611,762	329,928	100,800	215,552	237,170	60,875	96,217	30,794	180,147	310,452
9 Acreage irrigated in 1909.....	59,811	1,687	3,648	12,012	37,637	1,201	35,004	17,504	60,901	3,610
10 Per cent of total land area.....	6.5	0.1	1.3	0.7	4.4	0.4	1.3	3.0	1.5	0.7
11 Per cent of land in farms.....	7.3	0.1	2.3	1.1	5.1	0.8	8.5	20.8	13.2	0.8
12 Per cent of improved land in farms.....	9.8	0.5	3.6	5.6	16.9	1.8	34.3	56.8	32.4	1.2
13 <i>Acreage irrigated in 1899</i>	<i>13,466</i>	<i>1,187</i>	<i>(*)</i>	<i>3,218</i>	<i>40,097</i>	<i>(*)</i>	<i>16,159</i>	<i>19,603</i>	<i>49,108</i>	<i>2,806</i>
14 Per cent of increase, 1899-1909.....	223.9	48.4		273.3	6.1		104.2	28.7	22.8	28.7
15 Acreage enterprises were capable of irrigating in 1910.....	77,083	2,416	3,653	13,572	50,939	1,313	36,564	17,505	65,866	7,160
16 Acreage included in projects.....	173,563	2,539	3,983	13,603	60,140	2,232	72,653	18,249	79,161	8,192
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17 U. S. Reclamation Service, irrigated in 1909.....										
18 Enterprises were capable of irrigating in 1910.....										
19 Included in projects.....										
20 U. S. Indian Service, irrigated in 1909.....										
21 Enterprises were capable of irrigating in 1910.....										
22 Included in projects.....										
23 Carey Act enterprises, irrigated in 1909.....										
24 Enterprises were capable of irrigating in 1910.....										
25 Included in projects.....										
26 Irrigation districts, irrigated in 1909.....	3,000									
27 Enterprises were capable of irrigating in 1910.....	3,000									
28 Included in projects.....	71,050									
29 Cooperative enterprises, irrigated in 1909.....	3,000	448		90	2,175		8,854		2,750	
30 Enterprises were capable of irrigating in 1910.....	6,000	1,002		200	2,175		9,779		2,800	
31 Included in projects.....	6,000	1,002		200	2,475		28,054		2,800	
32 Commercial enterprises, irrigated in 1909.....	2,024			150	3,800	145			500	
33 Enterprises were capable of irrigating in 1910.....	7,563			1,000	10,000	145			500	
34 Included in projects.....	30,000			1,000	12,000	155			500	
35 Individual and partnership enterprises, irrigated in 1909.....	51,787	1,239	3,648	11,762	31,682	1,056	24,150	17,504	57,051	3,610
36 Enterprises were capable of irrigating in 1910.....	60,520	1,414	3,653	12,372	38,764	1,168	26,785	17,505	63,566	7,160
37 Included in projects.....	66,513	1,537	3,983	12,403	45,605	2,077	44,599	18,249	75,861	8,192
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38 Supplied from streams.....	51,169	1,490	2,551	3,717	14,195	576	31,843	17,154	51,104	1,575
39 By gravity.....	47,512	1,211	1,155	3,382	11,987	307	30,584	17,154	51,006	792
40 By pumping.....	3,657	279	1,396	335	2,208	269	1,259		98	783
41 Supplied from lakes.....						293				26
42 By gravity.....										26
43 By pumping.....						293				
44 Supplied from wells.....	8,642	127	1,057	8,220	23,302	240	213		140	2,008
45 Flowing.....		18		67	7,415	2				
46 By pumping.....	8,642	109	1,057	8,153	15,947	247	212		140	2,008
47 Supplied from springs.....		70		55	37	64	901	350	9,051	1
48 Supplied from reservoirs.....			40	20	43	19	47		6	
49 Total acreage supplied by pumping.....	12,299	388	2,453	8,488	18,155	740	1,471		238	2,791
IRRIGATION ENTERPRISES										
50 Independent enterprises..... number	1,200	65	85	108	842	97	472	100	572	132
51 <i>Number in 1899</i>										
52 Per cent of increase, 1899-1910.....										
53 Main ditches..... number	298	51	57	70	458	81	446	119	595	20
54 <i>Number in 1899</i>										
55 Per cent of increase, 1899-1910.....										
56 Length..... miles	308	42	58	75	228	41	678	150	688	22
57 <i>Length in 1899</i>										
58 Per cent of increase, 1899-1910.....										
59 Capacity..... cubic feet per second	5,415	84	458	140	1,611	161	3,150	2,304	2,576	101
60 Laterals..... number	49	5		4	39		130	4	172	
61 Length..... miles	192	3		5	27		81	1	41	
62 Reservoirs..... number	73	3	3	32	142	55	10	3	20	3
63 Capacity..... acre feet	134,014	52	33	13	9	1,228	3,903	8	107	1
64 Flowing wells..... number	4		7	438	2		2			
65 Capacity..... gallons per minute	70			250	110,816	10	290			
66 Pumped wells..... number	1,618	12	40	113	300	58	34		3	125
67 Capacity..... gallons per minute	432,281	4,410	3,955	24,520	287,668	8,383	6,550		250	70,338
68 Pumping plants..... number	1,304	31	59	65	687	70	61		10	127
69 Engine capacity..... horsepower	7,582	155	421	1,442	9,404	384	418		69	1,862
70 Pump capacity..... gallons per minute	553,134	12,116	8,341	37,135	338,915	16,324	31,937		1,217	100,715
COST										
71 Cost of enterprises up to July 1, 1910..... dollars	1,689,720	32,311	90,921	370,186	1,337,216	76,621	430,766	69,650	370,627	135,532
72 <i>Cost in 1899</i>										
73 Per cent of increase, 1899-1910.....										
74 Average cost per acre enterprises were capable of irrigating in 1910..... dollars	21.92	13.37	24.89	27.28	26.25	58.36	11.78	3.98	5.54	18.93
75 <i>Average cost per acre irrigated in 1899</i>										
76 Estimated final cost of existing enterprises..... dollars	3,324,720	32,311	90,921	370,186	1,337,216	76,621	440,766	69,650	370,627	135,532
77 Average per acre included in projects..... dollars	19.10	12.73	22.83	27.21	22.24	34.33	6.07	3.82	4.68	16.54
OPERATION AND MAINTENANCE										
78 Acreage for which cost is reported.....	5,024	184		90	5,800		8,694		1,700	
79 Total cost reported..... dollars	5,053	395		704	3,674		6,934		898	
80 Average per acre for which cost is reported..... dollars	1.01	2.15		7.82	0.63		0.80		0.53	
81 <i>Average cost per acre in 1899</i>										
82 Per cent of increase, 1899-1909.....										

² Decrease.

⁴ Not reported.

⁵ Not reported by counties.

IRRIGATION—CALIFORNIA.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND COST OF OPERATION AND MAINTENANCE, BY COUNTY: 1909 AND 1910—Continued.

[Comparative data for 1899 in italics.]

	Sonoma.	Stanislaus.	Sutter.	Tehama.	Trinity.	Tulare.	Tuolumne.	Ventura.	Yolo.	Yuba.
1 Number of all farms in 1910.....	4,772	2,687	873	1,006	308	4,021	386	1,293	1,255	436
2 Number of farms irrigated in 1909.....	38	1,911	39	366	201	3,048	157	489	333	112
3 Per cent of all farms.....	0.8	71.1	4.5	36.4	65.3	75.8	40.7	37.8	26.5	25.7
4 <i>Number of farms irrigated in 1899.....</i>	(1)	<i>281</i>	(1)	<i>209</i>	<i>170</i>	<i>21,467</i>	<i>185</i>	<i>353</i>	<i>167</i>	<i>181</i>
5 Per cent of increase, 1899-1909.....		764.7		75.1	18.2	107.5	³ 15.1	38.5	99.4	³ 38.1
LAND AND FARM AREA										
6 Approximate land area.....acres.....	1,009,280	928,000	389,120	1,851,520	2,026,240	3,107,840	1,401,000	1,201,920	648,960	408,960
7 Land in farms.....acres.....	744,644	649,392	438,462	915,227	91,310	1,045,231	193,072	550,199	463,383	249,108
8 Improved land in farms.....acres.....	248,271	512,189	199,510	180,642	13,300	507,024	36,407	213,868	317,268	94,250
9 Acreage irrigated in 1909.....	631	84,015	1,173	14,281	6,324	265,404	2,035	25,273	11,754	3,073
10 Per cent of total land area.....	0.1	9.1	0.3	0.8	0.3	8.5	0.1	2.1	1.8	0.8
11 Per cent of land in farms.....	0.1	12.9	0.3	1.6	6.9	25.4	1.1	4.6	2.5	1.2
12 Per cent of improved land in farms.....	0.3	16.4	0.6	7.7	47.5	52.3	5.6	11.8	3.7	3.3
13 <i>Acreage irrigated in 1899.....</i>	(1)	<i>17,506</i>	(1)	<i>11,512</i>	<i>4,710</i>	<i>286,364</i>	<i>1,381</i>	<i>11,095</i>	<i>5,161</i>	<i>2,477</i>
14 Per cent of increase, 1899-1909.....		379.9		24.1	34.3	205.6	47.4	111.8	127.7	24.1
15 Acreage enterprises were capable of irrigating in 1910.....	761	141,785	1,361	23,167	7,127	337,938	2,038	49,407	14,697	6,401
16 Acreage included in projects.....	951	340,914	1,959	36,020	9,513	466,735	5,958	56,367	55,967	46,322
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17 U. S. Reclamation Service, irrigated in 1909.....										
18 Enterprises were capable of irrigating in 1910.....										
19 Included in projects.....										
20 U. S. Indian Service, irrigated in 1909.....										
21 Enterprises were capable of irrigating in 1910.....										
22 Included in projects.....										
23 Carey Act enterprises, irrigated in 1909.....										
24 Enterprises were capable of irrigating in 1910.....										
25 Included in projects.....										
26 Irrigation districts, irrigated in 1909.....		67,313				82,428				1,750
27 Enterprises were capable of irrigating in 1910.....		121,083				124,638				4,500
28 Included in projects.....		303,313				144,038				43,000
29 Cooperative enterprises, irrigated in 1909.....				1,700		125,411		10,180		
30 Enterprises were capable of irrigating in 1910.....				3,200		140,571		16,388		
31 Included in projects.....		19,000		3,200		227,788		18,425		
32 Commercial enterprises, irrigated in 1909.....		12,230	500	2,900		11,160	1,450	7,650	10,400	281
33 Enterprises were capable of irrigating in 1910.....		12,230	500	5,600		11,680	1,450	20,400	10,400	781
34 Included in projects.....		14,127	1,000	11,500		16,820	5,055	22,000	50,400	781
35 Individual and partnership enterprises, irrigated in 1909.....	631	4,472	673	9,081	6,324	46,417	585	7,443	1,354	1,042
36 Enterprises were capable of irrigating in 1910.....	761	4,472	861	14,467	7,127	55,069	633	12,019	4,297	1,120
37 Included in projects.....	951	4,474	959	21,320	9,513	78,089	903	15,932	5,567	2,541
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38 Supplied from streams.....	434	84,010	660	13,464	5,984	227,280	1,891	18,198		2,791
39 By gravity.....	255	82,120	600	12,891	5,911	226,939	1,869	18,130		2,791
40 By pumping.....	179	1,890		573	73	341	22	68		
41 Supplied from lakes.....									11,467	
42 By gravity.....									10,400	
43 By pumping.....									1,067	
44 Supplied from wells.....	157	5	313	560	2	37,942	8	6,750	297	238
45 Flowing.....				1		6,650	3	581		
46 By pumping.....	157	5	313	565	2	31,285	5	6,169	297	238
47 Supplied from springs.....	40		200	251	338	169	130	72		44
48 Supplied from reservoirs.....						13		253		
49 Total acreage supplied by pumping.....	336	1,895	313	1,138	75	31,027	27	6,237	1,354	238
IRRIGATION ENTERPRISES										
50 Independent enterprises.....number.....	40	27	21	270	193	908	61	189	47	39
51 <i>Number in 1899⁵.....</i>										
52 Per cent of increase, 1899-1910.....										
53 Main ditches.....number.....	32	23	13	130	208	752	62	148	8	36
54 <i>Number in 1899⁵.....</i>										
55 Per cent of increase, 1899-1910.....										
56 Length.....miles.....	21	163	6	164	228	1,033	153	177	87	128
57 <i>Length in 1899⁵.....</i>										
58 Per cent of increase, 1899-1910.....										
59 Capacity.....cubic feet per second.....	14	3,074	27	1,325	802	6,526	245	627	214	398
60 Laterals.....number.....		34		41	41	577	11	53	8	13
61 Length.....miles.....	3	274		40	13	629	24	87	83	87
62 Reservoirs.....number.....	3	5	5	43	30	63	0	32	5	5
63 Capacity.....acre-feet.....	1	30,016	1	311	427	1,326	10	80	2	80
64 Flowing wells.....number.....				1		79	2	32		
65 Capacity.....gallons per minute.....				8		35,513	14	17,455		
66 Pumped wells.....number.....	11	3	18	141	1	794	4	157	58	11
67 Capacity.....gallons per minute.....	6,831	950	6,616	16,276	750	237,420	16	64,829	29,400	1,605
68 Pumping plants.....number.....	27	21	19	165	3	789	7	123	46	11
69 Engine capacity.....horsepower.....	134	707	124	761	34	7,804	89	2,970	981	62
70 Pump capacity.....gallons per minute.....	16,763	185,950	6,616	39,680	1,920	244,318	705	72,704	69,694	1,605
COST										
71 Cost of enterprises up to July 1, 1910.....dollars.....	13,801	4,051,870	18,800	263,055	173,414	5,634,379	180,474	2,262,205	311,660	193,268
72 <i>Cost in 1899⁶.....</i>										
73 Per cent of increase, 1899-1910.....										
74 Average cost per acre enterprises were capable of irrigating in 1910.....dollars.....	18.14	28.58	13.81	11.35	24.33	16.67	86.64	45.79	21.21	30.97
75 <i>Average cost per acre irrigated in 1899⁶.....</i>										
76 Estimated final cost of existing enterprises.....dollars.....	13,801	5,326,870	18,800	342,555	173,414	5,643,379	180,474	2,317,205	311,660	193,268
77 Average per acre included in projects.....dollars.....	14.51	15.63	9.60	9.51	18.23	12.09	30.29	41.12	5.57	4.28
OPERATION AND MAINTENANCE										
78 Acreage for which cost is reported.....		79,543		4,600		124,061	200	14,604	10,400	1,750
79 Total cost reported.....dollars.....		69,633		4,132		175,823	200	48,418	18,146	1,037
80 Average per acre for which cost is reported.....dollars.....		0.88		0.90		1.41	1.00	3.32	1.74	0.59
81 <i>Average cost per acre in 1899⁶.....</i>										
82 Per cent of increase, 1899-1909.....										

¹Included in "all other counties" in Twelfth Census report.
²Exclusive of Indian reservations.

³Decrease.
⁴See explanation at close of text.

⁵Not reported.
⁶Not reported by counties.

IRRIGATION: COLORADO

FARMS AND ACREAGE IRRIGATED, IRRIGATION WORKS, COST OF CONSTRUCTION, COST OF OPERATION AND MAINTENANCE,
AND CROPS IRRIGATED

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INTRODUCTION.

This bulletin presents the larger part of the statistics of irrigation for Colorado obtained in connection with the Thirteenth Census. These data, with additional information, will be embodied in a special report of the Census of Irrigation and in the final reports of the Thirteenth Census. The statistics of the number of farms and acreage irrigated, cost of operation and maintenance, and irrigated crops are for the calendar year 1909; those of irrigation works, cost of enterprises, acreage enterprises were capable of irrigating in 1910, and acreage included in projects are of the date July 1, 1910.

These statistics have been collected under the law of February 25, 1910, which contained the following clause relating to irrigation:

Inquiries shall also be made as to the location and character of irrigation enterprises, quantity of land irrigated in the arid region of the United States and in each state and county in that section under state and Federal laws; the price at which these lands, including water rights, are obtainable; the character and value of crops produced on irrigated lands, the amount of water used per acre for said irrigation and whether it was obtainable from national, state, or private works; the location of the various projects and methods of construction, with facts as to their physical condition; the amount of capital invested in such irrigation works.

The information called for by this law which could be supplied by farm operators was obtained on supplemental schedules by the regular census enumerators as a part of the agricultural census. The remaining data, which were supplied by the owners or officials of irrigation enterprises, were obtained on special schedules by special agents. The data relating to number of farms irrigated and irrigated crops are taken from the supplemental schedules, while all data relating to acreage irrigated and to irrigation works and their construction and operation are taken from the special schedules.

In accordance with the law, the data collected have been classified primarily by the state and Federal laws by virtue of which the land was brought under irrigation. The results are presented in detail at the end of this bulletin and summarized in text tables.

Such of the terms used as are not self-explanatory are defined below.

Farms irrigated.—The number of "farms irrigated" is the number of farms on which irrigation is practiced and is equivalent to the term "number of irrigators" used in previous census reports.

Types of enterprise.—The types of enterprise under which the lands irrigated in 1909 are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who own no interest in the works. Persons obtaining water from such enterprises are usually required to pay for the right to receive water, and to pay, in addition, annual charges based in some instances on the acreage irrigated and in others on the quantity of water received.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization. It is not always possible to distinguish between partnership and cooperative enterprises, but as the difference is slight this is unimportant.

Source of water supply.—Of the terms used in the classification according to source of water supply, none requires explanation except "reservoirs." The only reservoirs which are treated as independent sources of supply are those filled by collecting storm water or from watercourses that are ordinarily dry. When reservoirs are filled from streams or wells, the primary source is considered the source of supply.

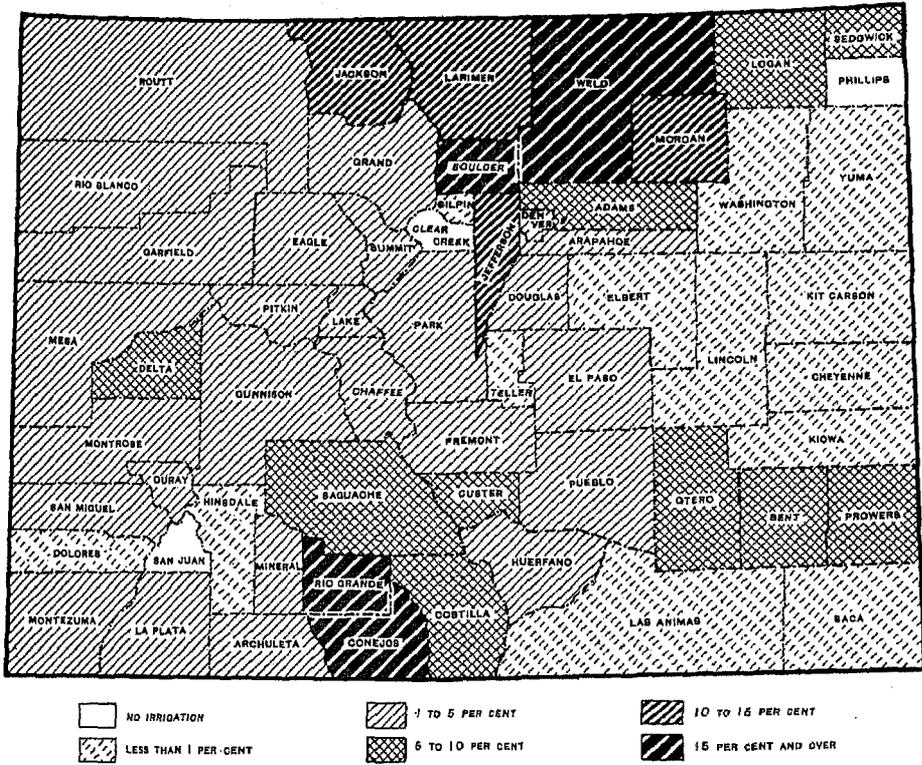
Acre-foot.—The "acre-foot," used to express the capacity of reservoirs, is the volume of water required to cover 1 acre to a depth of 1 foot, or 43,560 cubic feet.

Cost.—The cost of irrigation enterprises is that given by the owners. For the larger works the cost given is taken, in most cases, from the books of account and represents the actual cost. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the cost given represents the owners' estimates. The cost reported for 1910 includes the cost of construction and of acquiring rights. The latter usually consists of filing fees only. In some instances it includes the purchase price of rights, but these cases are so rare that they are unimportant. The cost reported for 1899 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. The average cost per acre is based on the acreage enterprises were capable of irrigating in 1910 and the cost to July 1, 1910.

PER CENT OF TOTAL LAND AREA IRRIGATED, AND PER CENT OF NUMBER OF FARMS IRRIGATED,
IN COLORADO, BY COUNTIES: 1909.

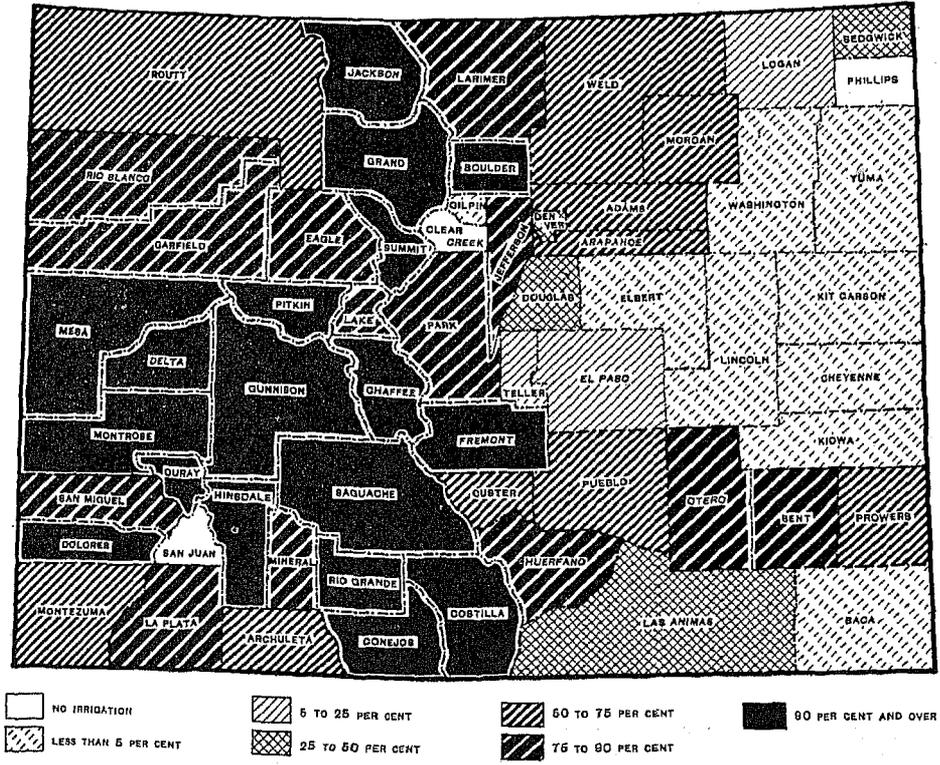
PER CENT OF TOTAL LAND AREA IRRIGATED.

[Per cent for the state, 4.2.]



PER CENT OF NUMBER OF FARMS IRRIGATED.

[Per cent for the state, 56.]



FARMS AND ACREAGE IRRIGATED.

The irrigated area of Colorado in 1909 was the largest reported for any of the states in the arid region. Irrigation is practiced generally throughout the state, only three counties, Clear Creek, Phillips, and San Juan, having no land under irrigation in that year. The eastern two-fifths of the state, which lies in the Great Plains section, is principally devoted to grazing and dry farming, except the lands in the valleys of the Arkansas and South Platte Rivers, extending from the mountains to the eastern boundary, which include the largest irrigated area in the state. The western and mountainous portion of Colorado contains numerous fertile valleys, in which irrigation has also been extensively developed. In this section irrigation is generally an essential factor in agriculture, but in portions of the eastern counties there is sufficient rainfall in most seasons for the successful growing of some crops without irrigation. The location of the irrigated lands of the state is indicated in a general way by the maps on the opposite page, in which the different counties are graphically classified according to the percentage which irrigated land forms of their total land area and the

percentage which irrigated farms represent of all farms.

The following table shows, for the state as a whole, the number of farms and acreage irrigated in 1909, in comparison with the total number of farms, the total land area, the total land in farms, and the total acreage of improved land in farms in 1910, together with the areas not yet irrigated for which water has been or is being made available. Comparative statistics for the census of 1900 are included as far as possible. The figures as to farms and acreage irrigated in 1899 do not include statistics for Indian reservations, which were not shown in the irrigation report for Colorado for that year, and therefore they are not strictly comparable with the figures for the total number of farms and total farm acreage reported in 1900, as shown in this table, or with the statistics for farms and acreage irrigated in 1909. Since, however, irrigated farms and land on reservations formed only small proportions of the corresponding totals for the state in 1909, comparisons are but little affected by the omission in the Twelfth Census report.

	CENSUS OF—		INCREASE, ¹	
	1910	1900	Amount.	Per cent.
Number of all farms.....	² 46, 170	³ 24, 700	21, 470	86. 9
Approximate land area of the state..... acres..	66, 341, 120	66, 341, 120		
Land in farms..... acres..	² 13, 532, 113	³ 9, 474, 588	4, 057, 525	42. 8
Improved land in farms..... acres..	² 4, 302, 101	³ 2, 273, 968	2, 028, 133	89. 2
Number of farms irrigated.....	⁴ 25, 857	⁵ 17, 613	8, 244	46. 8
Acreage irrigated.....	⁴ 2, 792, 032	⁵ 1, 611, 271	1, 180, 761	73. 3
Acreage enterprises were capable of irrigating.....	⁶ 3, 990, 166	(⁷)		
Acreage included in projects.....	⁶ 5, 917, 457	(⁷)		
Percentage irrigated of—				
Number of all farms.....	56. 0	71. 3	-15. 3	
Approximate land area of the state.....	4. 2	2. 4	1. 8	
Land in farms.....	20. 6	17. 0	3. 6	
Improved land in farms.....	64. 9	70. 9	-6. 0	
Excess of acreage enterprises were capable of irrigating in 1910 over acreage irrigated in 1909.....	1, 198, 134			
Excess of acreage included in projects over acreage irrigated in 1909.....	3, 125, 425			

¹ A minus sign (-) denotes decrease. ² April 15. ³ June 1. ⁴ In 1909. ⁵ In 1899, exclusive of Indian reservations. ⁶ July 1. ⁷ Not reported.

Number of farms irrigated.—The number of farms irrigated is made up of the number reported on the supplemental schedules by the regular enumerators, together with an estimate of the number of farms covered by enterprises which were reported by special agents but not by the regular enumerators. This estimate was based upon the average acreage irrigated per farm shown by the supplemental schedules.

According to the figures presented in the table, irrigation was practiced on more than one-half (56 per cent) of the farms in the state in 1909. In 1899 the proportion of irrigated farms was much higher (71.3 per cent), while in 1889 it was 58.9 per cent. It is apparent that in the 10 years from 1889 to 1899 the number of irrigated farms increased more rapidly than the number on which irrigation was not practiced.

In the later decade, however, owing largely to the marked advance of dry farming in the eastern part of the state, the rate of increase in the number of unirrigated farms was about four times as great as that in the number of irrigated farms.

In 41 out of the 60 counties of the state more than half the farms are irrigated. The proportion is between 40 and 50 per cent in 1 county, between 30 and 40 per cent in 3, 20 per cent in 1, between 10 and 20 per cent in 2, and less than 10 per cent in 9. No irrigation was reported in 1909 for the remaining three counties. The counties in which more than half the farms are irrigated are all in the western three-fifths of the state, with the exception of those in the valley of the Arkansas River, which form a row extending eastward across the state, and four counties which

form a group in the northern part in the valley of the South Platte River. The counties having low percentages, with the exception of Gilpin County, are in the eastern section of the state, as is one of the three counties from which no irrigation was reported. Rio Grande County shows the highest proportion of irrigated farms, 99.6 per cent, but in 17 other counties more than 90 per cent of the farms are irrigated.

From 1899 to 1909 the increase in the number of farms irrigated for the state as a whole was 46.8 per cent. Of the 48 counties in which irrigation was practiced that did not undergo any change of area during the 10 years, 35 show increases, varying greatly in degree, while 13 show decreases. Of the latter group, 7 counties are in the "dry farm" section, while the other 6 are scattered through the mountainous portion of the state. In the territory constituting Adams, Arapahoe, Denver, Washington, and Yuma Counties in 1910, and Arapahoe, Washington, and Yuma Counties in 1900, there was an increase of 13.4 per cent, and in that comprising Jackson and Larimer Counties in 1910 and Larimer County in 1900, an increase of 31.7 per cent, while the combined area of Jefferson and Park Counties showed an increase of 42.3 per cent.

Acreage irrigated.—The acreage irrigated is taken from the special schedules filled out by agents from information obtained from owners or officials of irrigation enterprises and, in some instances, from public records. The acreage thus obtained is considerably larger than the irrigated acreage reported on the supplemental schedules filled out by the farm enumerators. This difference is due in a measure to the fact that the special agents found enterprises which were not reported on any schedules returned by the enumerators, indicating that the acreage reported on the supplemental schedules is under the true figure. There is, however, a natural tendency for the officials of irrigation enterprises to report as irrigated the entire area of farms of which only a part was irrigated. Furthermore, some farms are so situated as to receive water from more than one enterprise, and may be reported as irrigated by each, which results in duplication. Owing to the two causes last enumerated, it is probable that the acreage irrigated as shown in this bulletin is somewhat excessive, but the extent of this excess can not be determined. It is believed, however, to be less than 10 per cent for the state of Colorado.

The total acreage reported as irrigated in 1909 was 2,792,032 acres, as against 1,611,271 acres in 1899 and 890,735 acres in 1889. The percentage of increase from 1889 to 1899 was 80.9, while that from 1899 to 1909 was 73.3. The absolute increase shown for the later decade was the larger, however, 1,180,761 acres, compared with 720,536 acres in the earlier decade.

The percentage of increase between 1899 and 1909 in the acreage irrigated was considerably higher than the percentage of increase in the number of farms irrigated, the acreage irrigated per farm increasing from 91.5 in

1899 to 108 in 1909. As a decrease from 383.6 acres to 293.1 acres in the average size of the farms of the state was reported for the same period, it is probable that farmers are irrigating larger parts of their holdings than formerly. It is not possible, however, to determine how far this is actually the case as the higher average size shown for 1900 was due to a considerable extent to the inclusion of some large tracts of land used for grazing which in 1910 were not reported as farm land.

The percentage irrigated of the total land area of the state increased from 2.4 in 1899 to 4.2 in 1909, while the percentage of all land in farms which was under irrigation increased from 17 in 1899 to 20.6 in 1909. As a result of the rapid development of dry farming in recent years, however, there was a decrease in the percentage of the total improved land in farms which was under irrigation, from 70.9 in 1899 to 64.9 in 1909.

In both 1909 and 1899 the county for which the largest area of irrigated land was reported was Weld, with an irrigated acreage of 395,514 and 226,613 at the respective censuses. No other county had an area of irrigated land amounting to 200,000 acres in 1909, but in 7 others the land reported as irrigated exceeded 100,000 acres, while in 15 additional counties it exceeded 50,000 acres.

The county in which irrigated land formed the highest percentage of the total land area was Boulder, the proportion being 23.1 per cent. In three other counties, namely, Rio Grande, Conejos, and Weld, the percentage was over 15, and in 4 it was between 10 and 15.

Acreage included in projects.—The foregoing table shows that in 1910 existing enterprises were ready to supply water to 3,990,166 acres, or 1,198,134 acres more than were irrigated in 1909. It is probable that, after allowance is made for an increase in the area irrigated in 1910 over that in 1909, there remained at the close of 1910 under ditch, but not irrigated, almost as much land as was brought under irrigation in the 10 years from 1899 to 1909. The acreage included in projects exceeds the acreage irrigated in 1909 by 3,125,425 acres, which is more than two and one-half times the acreage brought under irrigation in the last decade, and somewhat more than the total area irrigated in 1909. This acreage represents the area which will be available for the extension of irrigation in the next few years upon the completion of existing enterprises and without new undertakings. It indicates in a general way the area available for settlement, although much of this unirrigated land is in farms already settled.

Acreage irrigated, classified by character of enterprise.—The next table gives the distribution of the acreage irrigated in 1909 according to the character of the enterprise controlling the irrigation works.

Irrigation districts, cooperative enterprises, and individual and partnership enterprises are all controlled by the water users. These supplied 93.6 per cent of

the acreage irrigated in 1909, while United States Reclamation Service and Carey Act enterprises, which are to be turned over to the water users, supplied 0.6 per cent of the acreage irrigated. Thus less than 6 per cent of the irrigated land is supplied by works which are not either controlled by the water users or to be turned over to them ultimately.

CHARACTER OF ENTERPRISE.	ACREAGE IRRIGATED IN 1909.	
	Amount.	Per cent distribution.
All classes	2,792,032	100.0
U. S. Reclamation Service.....	16,600	0.6
U. S. Indian Service.....	1,020	(¹)
Carey Act enterprises.....	485	(¹)
Irrigation districts.....	115,304	4.1
Cooperative enterprises.....	1,273,141	45.6
Commercial enterprises.....	159,457	5.7
Individual and partnership enterprises.....	1,226,025	43.9

¹ Less than one-tenth of 1 per cent.

Acreage irrigated, classified by source of water supply.—The table following shows the distribution of the acreage irrigated in 1909 according to the source from which the water supply for irrigation is obtained:

SOURCE OF WATER SUPPLY.	ACREAGE IRRIGATED IN 1909.	
	Amount.	Per cent distribution.
All sources	2,792,032	100.0
Streams.....	2,753,283	98.8
Lakes.....	1,056	(¹)
Wells.....	8,282	0.3
Springs.....	8,320	0.3
Reservoirs.....	16,091	0.6

¹ Less than one-tenth of 1 per cent.

From this table it is apparent that up to the present time there has been comparatively little development of any source of water supply other than streams.

IRRIGATION WORKS.

The following statement summarizes the data collected relating to works for supplying water for irrigation in 1910:

Number of independent enterprises.....	9,065
Ditches, total length.....miles..	22,570
Main ditches.....number..	8,405
Length.....miles..	17,564
Capacity.....cubic feet per second..	148,483
Lateral ditches.....number..	5,612
Length.....miles..	5,006
Reservoirs.....number..	1,084
Capacity.....acre-feet..	2,646,593
Flowing wells.....number..	313
Capacity.....gallons per minute..	41,989
Pumped wells.....number..	121
Capacity.....gallons per minute..	53,564
Pumping plants.....number..	206
Engino capacity.....horsepower..	7,969
Pump capacity.....gallons per minute..	296,937

The only figures available for comparison from the earlier census are those for the number of systems (1,890), outside of Indian reservations, that received water from streams by gravity diversion in 1899, and the length of main ditches reported for these systems (7,374 miles). As compared with the latter figure, the length of main ditches reported in 1910 represents an increase of 10,190, or 138.2 per cent, which, however, is somewhat higher than the actual increase, owing to the fact that the figure for

1910 covers Indian reservations and enterprises receiving water from sources other than streams.

Assuming that the enterprises in operation in 1909 were identical with those reported in 1910, the average number of acres irrigated per enterprise in 1909 was 308, and the acreage irrigated per mile of main ditch was 159. For the 1,890 irrigation systems that, in 1899, received water from streams by gravity diversion, the average acreage irrigated per enterprise in that year was 849 and the acreage irrigated per mile of main ditch was 218.

In certain sections of the state, considerable attention is being given to the utilization of underground water for irrigation. The statement above shows 313 flowing wells and 121 wells pumped for irrigation, which watered altogether 8,282 acres in 1909. Of the flowing wells, which irrigated 5,171 acres, more than one-third were in Conejos County, but Fremont, Saguache, Rio Grande, and El Paso Counties each reported a considerable number. The pumped wells are scattered generally over the state, and no county, except Weld, with 47, showed a large number. The water pumped for irrigation is, however, for the most part taken from streams.

COST OF CONSTRUCTION, OPERATION, AND MAINTENANCE.

The table following shows the total cost of irrigation enterprises up to July 1, 1910, including construction of works and acquisition of rights but not operation and maintenance, with the average cost per acre, based on the acreage the enterprises were capable of irrigating in 1910; the estimated final cost of enterprises completed and enterprises now under construction, with the average cost per acre, based on the acreage included in projects; and the total cost and average cost per acre of operation and maintenance in 1909. Data relating to the cost of construction and maintenance of systems operated in 1899 are included

for comparison. The figure for average cost per acre of operation and maintenance in 1899 does not cover the cost for systems receiving water from wells, which supplied 7,058 acres in that year. Indian reservations, as previously stated, are not covered by the figures from the earlier census.

The cost of operation and maintenance is not reported for individual and partnership enterprises, for the reason that farmers whose land is irrigated by such systems generally clean their own ditches at odd times without keeping any record of the time spent. In the case of the larger enterprises this cost repre-

IRRIGATION—COLORADO.

sents a cash outlay by the farmers, while in the case of many of the smaller cooperative enterprises the cost is worked out by the farmers.

	CENSUS OF—		INCREASE.	
	1910	1900	Amount.	Per cent.
Cost of irrigation enterprises	\$56,636,443	\$11,758,703	\$44,877,740	381.7
Average per acre	\$14.19	\$7.30	(b)	.....
Estimated final cost of existing enterprises	\$76,443,239	(c)	.....	.....
Average per acre included in projects	\$12.92	(c)	.....	.....
Operation and maintenance:				
Acreage for which cost is reported	1,401,670	(e)	.....	.....
Total cost reported	\$1,046,268	(e)	.....	.....
Average cost per acre	\$0.75	\$0.34	\$0.41	120.6

¹ Reported July 1.
² Cost of construction of systems operated in 1899, exclusive of Indian reservations.
³ Based on acreage enterprises were capable of irrigating in 1910.
⁴ Based on acreage irrigated in 1899.
⁵ Figures not comparable. (See explanation in text.)
⁶ Not reported.
⁷ For 1909.
⁸ Figure relates only to systems obtaining water from streams, outside of Indian reservations.

The cost of irrigation systems shows the largest increase of any item included in the census of irrigation, 381.7 per cent, while the average cost per acre also shows a considerable increase. The figures shown for the average cost at the two censuses are not, however, strictly comparable. The average cost per acre shown for 1910 is based on the acreage under ditch in that year, but since the corresponding acreage for 1900 was not reported, the figure for average cost at the earlier census is based on the acreage irrigated in 1899. If computed on the basis of the acreage irrigated in 1909, the average cost in 1910 would be \$20.29, representing an increase of 177.9 per cent over the figure for the average cost at the census of 1900. The year 1899

was near the close of the period of private and cooperative construction, when most of the works were built by the water users themselves with little or no expenditure of money, and near the beginning of the present period of large-scale construction by corporations and the Federal Government. This later construction is not only on a more extensive scale, but also more difficult and of a better type. Largely as a result of these changed conditions, the average cost per acre of irrigation has greatly increased. A number of large enterprises are under construction, upon which considerable expenditures have been made, while but little land is irrigated as yet. This condition tends to make the average cost shown higher than the true average. The average based on the estimated final cost and the acreage included in projects, \$12.92 per acre, probably more truly represents the average cost per acre of irrigation in Colorado.

The county showing the lowest average cost to July 1, 1910, \$1.38 per acre, is Jackson. The highest average cost per acre, \$51.73, is reported for Montrose County, where the unusual cost is due to the large expenditures made on works which were nearly complete July 1, 1910, but on that date were ready to supply with water only a part of the land to be irrigated ultimately.

The acreage for which cost of operation and maintenance in 1909 was reported constitutes 50.2 per cent of the total acreage reported as irrigated in 1909 and 89.5 per cent of the acreage reported as irrigated by other than individual and partnership enterprises. The cost reported can be said, therefore, to represent fairly the average annual expense for all but individual and partnership enterprises.

CROPS.

The following table shows the acreage, yield, and value of the principal crops reported as grown under irrigation in 1909, in comparison with totals for the same crops reported for the entire state:

CROP.	ACREAGE.			YIELD.			VALUE.	
	Total for state.	Irrigated.		Unit.	Total for state.	On irrigated land.	Total for state.	For irrigated land.
		Amount.	Per cent of total.					
Cereals:								
Corn	326,859	25,705	7.9	Bushels	4,903,304	567,151	\$2,673,584	\$370,400
Oats	275,948	192,311	69.7	Bushels	7,642,855	6,235,979	4,177,267	3,458,308
Wheat	340,729	174,116	51.1	Bushels	7,224,057	4,727,359	6,463,926	4,352,823
Emmer and spelt	15,523	3,771	24.3	Bushels	324,713	111,120	153,068	53,201
Barley	71,411	48,775	68.3	Bushels	1,889,342	1,483,112	1,100,753	897,849
Rye	15,715	898	5.7	Bushels	198,025	14,135	123,530	11,284
Other grains and seeds:								
Alfalfa seed	7,752	4,483	57.8	Bushels	18,040	9,628	137,212	83,070
Dry edible beans	5,040	2,504	49.7	Bushels	53,926	32,444	128,767	90,652
Dry peas	24,230	15,537	64.1	Bushels	258,281	199,945	397,540	282,095
Hay and forage:								
Timothy alone	51,505	45,020	87.4	Tons	82,482	76,660	746,146	602,213
Timothy and clover mixed	45,001	24,049	53.4	Tons	84,636	47,007	685,164	355,529
Clover alone	1,418	405	28.6	Tons	3,696	888	29,106	7,864
Alfalfa	508,892	480,580	94.4	Tons	1,205,915	1,222,790	9,709,180	9,522,968
Other tame or cultivated grasses ¹	102,958	52,844	51.3	Tons	143,173	95,119	1,131,996	751,436
Wild, salt, or prairie grasses	394,799	209,755	75.9	Tons	368,408	288,536	3,080,956	2,444,558
Grains cut green	75,033	48,171	64.2	Tons	94,260	70,057	845,544	501,204
Coarse forage	101,721	7,767	7.6	Tons	156,547	20,775	848,532	101,784
Sundry crops:								
Potatoes	85,839	59,221	69.0	Bushels	11,780,674	8,408,915	3,704,768	2,889,789
Sugar beets	108,005	106,905	99.0	Tons	1,230,718	1,224,466	6,057,529	6,055,882
Orchard fruits and grapes	(9)	34,763	.....	.....	.....	.....	4,679,818	4,426,286
Small fruits	2,820	2,089	74.2	.....	.....	.....	398,836	379,979

¹ Includes millet or Hungarian grass.

² Preliminary tabulation, subject to correction.

³ Agricultural returns show number of trees and not acreage.

As previously stated, the data relating to irrigated crops are taken from supplemental schedules filled out by the regular census enumerators. Since the special agents found enterprises which the enumerators had not reported, it is evident that the information relating to irrigated crops is incomplete to some extent. It shows, however, the relative importance of the different irrigated crops, and is sufficiently complete to afford reliable averages of yields.

While small quantities of other crops are grown both on irrigated and unirrigated land, the leading crops of the state, as well as the leading crops grown under irrigation, are represented in the table. In the reports of the agricultural census the acreages of seed crops are not usually given, but since the growing of alfalfa seed is coming to be an important industry in the irrigated sections of the country, statistics for this crop are presented in the preceding table.

Acreage.—Of the entire acreage of the crops for which totals are presented in the table, slightly more than 60 per cent is irrigated, but the proportion irrigated varies widely for the different crops.

The cereals are generally grown without irrigation in the eastern counties, but for the state as a whole the irrigated acreage of the cereal crops given in the table represents 42.6 per cent of the total acreage shown for these crops. The highest percentage of acreage irrigated shown for any cereal, 69.7, is reported for oats, and the next highest, 68.3, for barley. For wheat and corn, which are the most important cereals in Colorado in respect to total acreage, the proportions are respectively 51.1 and 7.9 per cent.

The hay and forage crops are more generally irrigated than the cereals, the irrigated area of such crops given in the table forming 74.8 per cent of their total acreage. In the case of six of the eight hay and forage crops included in the table, more than half of the total acreage is irrigated. The irrigated alfalfa acreage forms 94.4 per cent of the entire acreage in that crop, and the irrigated acreage devoted to timothy alone forms 87.4 per cent of the total land in timothy. For "wild, salt, or prairie grasses," and for grains cut green, the corresponding percentages are 75.9 and 64.2, respectively.

Of the entire acreage in sugar beets 99 per cent is irrigated, and of that in potatoes, 69 per cent. The relative importance of the irrigated orchard acreage can not be determined, because the total acreage of orchards in the state was not reported, but it will be observed that more than 90 per cent of the value of all orchard fruits and grapes produced in the state represents that of products grown on irrigated land.

Of the crops shown in the table, alfalfa covers the largest irrigated acreage, representing 29.5 per cent of the total irrigated acreage of the crops given. The crop next in importance with respect to irrigated acreage is "wild, salt, or prairie grasses," with 18.4 per

cent of this total, followed by oats, with 11.8 per cent, and wheat, with 10.7 per cent. The percentage for sugar beets is 6.6. No other single crop covers as much as 4 per cent of the total acreage of irrigated crops presented in the table.

While most of the crops irrigated are well distributed geographically, there is a tendency toward the concentration of certain crops in particular localities. This is shown by the following statement, which gives the counties having the largest acreages of the principal irrigated crops, with the proportions which they contain of the total irrigated acreages of these crops in the state.

Corn.—Weld County, 14.5 per cent; Morgan, 10.5 per cent; Pueblo, 9.5 per cent; Mesa, 6.9 per cent.

Oats.—Weld County, 13.9 per cent; Rio Grande, 9.5 per cent; Larimer, 7.3 per cent; Otero, 6.3 per cent.

Wheat.—Weld County, 24.9 per cent; Boulder, 11.6 per cent; Adams, 7.5 per cent; Rio Grande, 7.2 per cent.

Emmer and spelt.—Prowers County, 51 per cent; Bent, 11 per cent; Morgan, 9.3 per cent; Logan, 9.2 per cent.

Barley.—Weld County, 31.8 per cent; Larimer, 10.7 per cent; Boulder, 10 per cent; Morgan, 9.5 per cent.

Alfalfa seed.—Prowers County, 37.2 per cent; Otero, 16 per cent; Logan, 15.8 per cent; Bent, 13.8 per cent.

Dry edible beans.—Otero County, 27.2 per cent; Las Animas, 26.5 per cent; Weld, 10 per cent; Costilla, 8.9 per cent.

Dry peas.—Conejos County, 43.1 per cent; Costilla, 25.1 per cent; Rio Grande, 17.1 per cent; Chaffee, 8.1 per cent.

Timothy alone.—Routt County, 30.3 per cent; Gunnison, 12.6 per cent; Ouray, 6.7 per cent; Jackson, 6.6 per cent.

Timothy and clover mixed.—Routt County, 44.5 per cent; Summit, 12 per cent; Gunnison, 11.7 per cent; Eagle, 7 per cent.

Alfalfa.—Weld County, 12.7 per cent; Larimer, 8.5 per cent; Otero, 7.8 per cent; Prowers, 6.6 per cent.

"Other tame or cultivated grasses."—Grand County, 24.4 per cent; Rio Blanco, 13.5 per cent; Gunnison, 11.9 per cent; Routt, 9.6 per cent.

"Wild, salt, or prairie grasses."—Jackson County, 21.2 per cent; Park, 12.2 per cent; Conejos, 11.7 per cent; Saguache, 9.6 per cent.

Grains cut green.—Rio Grande County, 35.9 per cent; Saguache, 19.8 per cent; Conejos, 16.5 per cent; Park, 1.9 per cent.

Coarse forage.—Prowers County, 23 per cent; Otero County, 17.3 per cent; Morgan, 12.9 per cent; Bent, 11.4 per cent.

Potatoes.—Weld County, 52.5 per cent; Rio Grande, 8.8 per cent; Garfield, 7 per cent; Montrose, 5.2 per cent.

IRRIGATION—COLORADO.

Sugar beets.—Weld County, 31.2 per cent; Larimer, 20.4 per cent; Otero, 13.9 per cent; Morgan, 6.7 per cent.

Orchard fruits and grapes.—Mesa County, 30.3 per cent; Delta, 25.9 per cent; Montrose, 7.8 per cent; Otero, 6.1 per cent.

Small fruits.—Jefferson County, 34.4 per cent; Fremont, 16.1 per cent; Larimer, 10.7 per cent; Boulder, 8.4 per cent.

Of the irrigated acreage of orchards not bearing in 1909, amounting to 15,175 acres, 46.4 per cent was in Mesa County; 13.1 per cent in Delta County; 7.7 per cent in Montrose County; and 7.5 per cent in Fremont County.

Yield.—In the next table the average yields per acre of certain crops extensively grown, both with and without irrigation, are shown. The yields on unirrigated land are obtained by subtracting the totals for irrigated crops from the totals for the state.

For all the crops given in the table, except alfalfa seed, greater average yields on irrigated than on unirrigated land in 1909 were reported. The percentage of excess is greatest in the case of sugar beets and next greatest in the case of oats.

Among the cereals shown the excess of the average yield under irrigation over that without irrigation ranges from 53.5 to 92.9 per cent. Of the hay and forage crops in the table, "timothy alone" shows the highest percentage of excess, 88.9, and timothy and clover mixed the lowest, 8.3.

In considering these comparisons it should be borne in mind that they are not comparisons of yields on irrigated and on unirrigated land in the same localities, but of yields under irrigation in localities where crops can not be grown to advantage without it with yields in localities where irrigation is not necessary. They do not indicate, therefore, the relative advantages of farming with and without irrigation in a given community, but rather give one factor for determining the relative advantages of farming where irrigation is necessary and where it is not necessary for the successful growing of crops.

CROP.	AVERAGE YIELD PER ACRE.		
	On unirrigated land.	On irrigated land.	
		Amount.	Per cent of excess over yield on unirrigated land. ¹
Corn.....bushels..	14.4	22.1	53.5
Oats.....bushels..	16.8	32.4	92.9
Wheat.....bushels..	15.0	27.2	81.3
Emmer and spelt.....bushels..	18.2	29.5	62.1
Barley.....bushels..	17.9	30.4	69.8
Alfalfa seed.....bushels..	2.6	2.1	-19.2
Dry edible beans.....bushels..	8.5	13.0	52.9
Dry peas.....bushels..	6.7	12.9	92.5
Timothy alone.....tons	0.90	1.70	88.9
Timothy and clover mixed.....tons	1.80	1.95	8.3
Alfalfa.....tons	1.52	2.54	67.1
Other tame or cultivated grasses.....tons	0.96	1.80	87.5
Wild, salt, or prairie grasses.....tons	0.84	0.96	14.3
Grains cut green.....tons	0.90	1.45	61.1
Coarse forage.....tons	1.44	2.07	85.4
Potatoes.....bushels..	126.7	142.0	12.1
Sugar beets.....tons	5.68	11.45	101.6

¹ A minus sign (-) indicates that the yield on irrigated land is less than that on unirrigated land.

COUNTY TABLE.

The next table gives in detail, by counties, the data summarized above, except those relating to crops. For purposes of comparison the total number of farms in the state, the approximate land area of the state, the total land in farms, and the improved land in farms have been included in the table.

Certain enterprises extend into more than one county, and in the case of some of these enterprises the reports do not segregate the data by counties. In such cases a distribution has been made according to the best estimates possible from all the information in the possession of the bureau. It is believed that these estimates are approximately correct.

Attention is directed to the fact that the totals for 1899 shown in this table do not cover Indian reservations, no report as to irrigation on reservations in Colorado having been made at the Twelfth Census. Since, however, the figures for the present census show that the irrigation operations conducted on

reservations were unimportant relatively to those in the state as a whole, it is believed that this shortage is not of material consequence as concerns comparisons between the two censuses. For this reason the percentages of increase have been computed without attempt to estimate the extent of Indian Service irrigation in 1899 or without elimination from the 1909 and 1910 totals of figures representing irrigation on reservations.

Change of boundaries.—In comparing the data secured in 1910 with those from the census of 1900, the following changes in county boundaries should be considered: The organization of Adams and Denver Counties from parts of Arapahoe County in 1902; the annexation of parts of Adams and Arapahoe Counties to Washington and Yuma Counties in 1903; the annexation of part of Jefferson County to Park County in 1908; the annexation of a part of Denver County to Adams County in 1909; and the organization of Jackson County from part of Larimer County in 1909.

IRRIGATION—COLORADO.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910.

[Comparative data for 1899 in italics.]

	THE STATE.	Adams.	Arapahoe. ¹	Archuleta.	Baca.	Bent.	Boulder.	Chaffee.	Cheyenne.	
1	Number of all farms in 1910.....	246,170	1,357	948	282	540	463	1,181	230	791
2	Number of farms irrigated in 1909.....	25,857	726	493	206	8	404	1,118	212	1
3	Per cent of all farms.....	56.0	53.5	52.0	73.0	1.5	87.3	94.7	92.2	0.1
4	Number of farms irrigated in 1899.....	<i>217,613</i>	<i>(1)</i>	<i>1,163</i>	<i>151</i>	<i>10</i>	<i>223</i>	<i>887</i>	<i>191</i>	<i>14</i>
5	Per cent of increase, 1899-1909.....	46.8			36.4	² 20.0	81.2	26.0	11.0	³ 92.9
LAND AND FARM AREA										
6	Approximate land area.....acres.....	266,841,120	807,680	538,880	780,800	1,633,280	975,360	488,960	693,120	1,137,280
7	Land in farms.....acres.....	<i>213,532,113</i>	363,785	284,917	85,130	257,344	168,297	190,922	37,286	216,210
8	Improved land in farms.....acres.....	<i>4,302,101</i>	100,238	62,608	16,095	34,953	59,919	113,231	16,733	75,755
9	Acres irrigated in 1909.....	2,792,032	67,339	26,341	15,008	211	59,497	112,724	16,142	200
10	Per cent of total land area.....	4.2	8.3	4.9	1.9	⁽⁴⁾	6.1	23.1	2.3	⁽⁴⁾
11	Per cent of land in farms.....	20.5	18.5	9.2	17.6	0.1	35.4	59.0	43.3	0.1
12	Per cent of improved land in farms.....	64.9	61.6	42.1	93.2	0.6	99.3	99.6	96.5	0.3
13	Acres irrigated in 1899.....	<i>2,611,271</i>	<i>(1)</i>	<i>81,807</i>	<i>6,529</i>	<i>156</i>	<i>53,039</i>	<i>33,766</i>	<i>15,071</i>	<i>291</i>
14	Per cent of increase, 1899-1909.....	73.3			129.9	35.3	50.1	34.6	23.5	³ 31.3
15	Acres enterprises were capable of irrigating in 1910.....	3,990,166	81,826	35,997	23,230	351	69,497	169,040	32,383	200
16	Acres included in projects.....	5,917,457	103,065	57,784	24,812	959	97,731	172,235	42,605	200
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17	U. S. Reclamation Service, irrigated in 1909.....	16,600								
18	Enterprises were capable of irrigating in 1910.....	30,000								
19	Included in projects.....	193,000								
20	U. S. Indian Service, irrigated in 1909.....	1,020								
21	Enterprises were capable of irrigating in 1910.....	2,020								
22	Included in projects.....	20,020								
23	Carey Act enterprises, irrigated in 1909.....	485								
24	Enterprises were capable of irrigating in 1910.....	6,085								
25	Included in projects.....	59,480								
26	Irrigation districts, irrigated in 1909.....	115,304								
27	Enterprises were capable of irrigating in 1910.....	207,570								
28	Included in projects.....	487,370								
29	Cooperative enterprises, irrigated in 1909.....	1,273,141	40,518	5,963	4,446		54,517	70,952	1,400	
30	Enterprises were capable of irrigating in 1910.....	1,870,447	54,840	6,644	9,003		63,457	113,276	1,400	
31	Included in projects.....	2,430,367	61,308	6,644	9,533		80,287	113,376	1,800	
32	Commercial enterprises, irrigated in 1909.....	159,457	13,268	13,684				12,324		
33	Enterprises were capable of irrigating in 1910.....	292,103	15,851	21,102				16,702		
34	Included in projects.....	681,687	24,320	42,324				17,027		
35	Individual and partnership enterprises, irrigated in 1909.....	1,226,025	7,553	6,694	10,562	211	4,950	20,448	14,742	200
36	Enterprises were capable of irrigating in 1910.....	1,581,941	11,135	8,251	14,227	351	6,010	39,062	30,983	200
37	Included in projects.....	2,039,533	17,437	8,816	15,279	959	11,444	41,832	40,805	200
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38	Supplied from streams.....	2,758,283	60,531	25,954	13,778	190	59,197	112,039	15,419	200
39	By gravity.....	2,745,035	66,531	25,754	13,778	190	59,197	112,029	15,419	200
40	By pumping.....	13,248		200				10		
41	Supplied from lakes.....	1,056	20							
42	By gravity.....	422								
43	By pumping.....	634	20							
44	Supplied from wells.....	8,282	176	252		21				
45	Flowing.....	5,171	123	20						
46	By pumping.....	3,111	53	232		21				
47	Supplied from springs.....	8,320	612	135				55	715	
48	Supplied from reservoirs.....	16,091			1,230		300	630	8	
49	Total acreage supplied by pumping.....	16,993	73	432		21		10		
IRRIGATION ENTERPRISES										
50	Independent enterprises.....number.....	9,065	89	62	136	8	50	270	203	1
51	Number in 1899.....	1,800								
52	Per cent of increase, 1899-1910.....	379.6								
53	Main ditches.....number.....	8,405	70	38	135	1	52	265	187	1
54	Number in 1899.....									
55	Per cent of increase, 1899-1910.....									
56	Length.....miles.....	17,564	174	196	211	2	240	570	311	1
57	Length in 1899.....	<i>27,374</i>								
58	Per cent of increase, 1899-1910.....									
59	Capacity.....cubic feet per second.....	148,483	3,453	2,192	767	20	3,269	6,256	1,486	3
60	Laterals.....number.....	5,612	18	8	31		313	49	39	
61	Length.....miles.....	5,006	26	211	28		929	73	29	
62	Reservoirs.....number.....	1,084	81	18	4		15	69	2	
63	Capacity.....acre-feet.....	2,640,593	38,151	796,004	627		131,842	30,220	5	
64	Flowing wells.....number.....	313	7	2						
65	Capacity.....gallons per minute.....	41,989	703	36						
66	Pumped wells.....number.....	121	10	8		10				
67	Capacity.....gallons per minute.....	53,564	2,097	2,425		2,882				
68	Pumping plants.....number.....	206	10	9	1	5	1	1	1	
69	Engine capacity.....horsepower.....	7,969	35	145	2	50	10	3	3	
70	Pump capacity.....gallons per minute.....	296,937	2,097	8,375	128	2,882	470	200		
COST										
71	Cost of enterprises up to July 1, 1910.....dollars.....	56,636,443	1,211,609	745,517	112,168	2,473	989,211	837,060	54,949	700
72	Cost in 1899.....	<i>211,768,703</i>								
73	Per cent of increase, 1899-1910.....	381.7								
74	Average cost per acre enterprises were capable of irrigating in 1910.....dollars.....	14.19	14.81	20.71	4.83	7.05	14.23	4.95	1.70	3.50
75	Average cost per acre irrigated in 1899.....	<i>27.30</i>								
76	Estimated final cost of existing enterprises.....dollars.....	76,443,239	1,417,100	745,517	112,168	2,473	989,211	901,143	54,949	700
77	Average per acre included in projects.....dollars.....	12.92	13.75	12.90	4.52	2.58	10.12	5.23	1.20	3.50
OPERATION AND MAINTENANCE										
78	Acres for which cost is reported.....	1,401,670	58,421	15,412	3,350		54,517	80,952	1,400	
79	Total cost reported.....dollars.....	1,046,268	25,225	21,415	809		22,315	34,260	400	
80	Average per acre for which cost is reported.....dollars.....	0.75	0.43	1.39	0.24		0.41	0.42	0.29	
81	Average cost per acre in 1899.....	<i>20.34</i>								
82	Per cent of increase, 1899-1909.....	120.6								

¹ Change of boundary. (See explanation at close of text.)

² Includes figures for Clear Creek, Phillips, and San Juan Counties, from which no irrigation was reported in 1909.

³ Decrease. ⁴ Less than one-tenth of 1 per cent. ⁵ Not reported. ⁶ Not reported by counties. Figure relates only to systems obtaining water from streams.

⁷ Total cost for state includes \$190,566, representing cost of well systems. Not reported by counties.

IRRIGATION—COLORADO.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND

[Comparative data for 1899 in italics.]

	Conejos.	Costilla.	Custer.	Delta.	Denver.	Dolores.	Douglas.	Eagle.	El Paso.
1 Number of all farms in 1910.....	756	387	240	1,741	235	31	418	248	1,285
2 Number of farms irrigated in 1909.....	737	350	142	1,709	72	30	157	218	174
3 Per cent of all farms.....	97.5	90.4	57.0	98.2	30.6	96.8	37.6	87.9	13.5
4 Number of farms irrigated in 1899.....	803	315	155	798	(1)	23	134	188	180
5 Per cent of increase, 1899-1909.....	22.2	11.1	28.4	114.2		30.4	17.2	16.0	23.3
LAND AND FARM AREA									
6 Approximate land area..... acres.....	891,520	1,133,440	478,080	768,640	37,120	667,520	540,800	1,036,800	1,357,440
7 Land in farms..... acres.....	188,650	159,366	90,709	142,193	2,703	5,578	342,018	62,899	728,445
8 Improved land in farms..... acres.....	131,916	114,612	27,080	62,604	2,209	1,136	48,393	25,401	148,597
9 Acreage irrigated in 1909.....	138,788	57,832	29,248	62,411	1,337	1,139	13,768	22,578	21,354
10 Per cent of total land area.....	15.6	5.1	6.1	8.1	3.6	0.2	2.5	2.2	1.6
11 Per cent of land in farms.....	73.6	36.3	32.2	43.9	48.4	20.4	4.0	35.9	2.9
12 Per cent of improved land in farms.....	105.2	50.5	103.0	99.7	60.5	100.3	28.5	88.9	14.4
13 Acreage irrigated in 1899.....	98,486	50,290	11,183	35,219	(1)	856	7,962	18,486	13,131
14 Per cent of increase, 1899-1909.....	40.9	15.1	161.5	77.2		33.2	72.9	22.1	62.6
15 Acreage enterprises were capable of irrigating in 1910.....	262,040	106,745	33,610	99,185	1,338	2,042	24,624	28,116	28,214
16 Acreage included in projects.....	335,253	255,485	34,610	174,830	1,338	2,052	25,405	32,925	41,438
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS									
CLASSIFIED BY CHARACTER OF ENTERPRISE.									
17 U. S. Reclamation Service, irrigated in 1909.....				2,000					
18 Enterprises were capable of irrigating in 1910.....				2,000					
19 Included in projects.....				2,000					
20 U. S. Indian Service, irrigated in 1909.....									
21 Enterprises were capable of irrigating in 1910.....									
22 Included in projects.....									
23 Carey Act enterprises, irrigated in 1909.....	400								
24 Enterprises were capable of irrigating in 1910.....	6,000								
25 Included in projects.....	22,480								
26 Irrigation districts, irrigated in 1909.....		10,234		600					
27 Enterprises were capable of irrigating in 1910.....		28,671		2,500					
28 Included in projects.....		28,671		3,000					
29 Cooperative enterprises, irrigated in 1909.....	47,200	33,800		35,104	543				3,200
30 Enterprises were capable of irrigating in 1910.....	158,548	54,900		62,325	543				4,200
31 Included in projects.....	213,218	119,680		119,645	543				8,200
32 Commercial enterprises, irrigated in 1909.....	33				391		4,324		
33 Enterprises were capable of irrigating in 1910.....	1,100	6,000		515	391		11,215		
34 Included in projects.....	1,100	90,000		515	391		11,509		
35 Individual and partnership enterprises, irrigated in 1909.....	91,155	13,748	20,248	24,707	403	1,139	9,444	22,578	18,154
36 Enterprises were capable of irrigating in 1910.....	96,392	17,174	33,610	31,845	404	2,042	13,400	28,116	24,614
37 Included in projects.....	98,455	17,234	34,610	40,670	404	2,052	13,806	32,925	33,238
ACREAGE IRRIGATED									
CLASSIFIED BY SOURCE OF WATER SUPPLY.									
38 Supplied from streams.....									
39 By gravity.....	136,407	57,770	20,226	61,490	1,334	1,139	13,151	22,548	21,020
40 By pumping.....	136,407	57,770	20,226	61,015	1,334	1,139	13,151	22,548	21,020
41 Supplied from lakes.....				475					
42 By gravity.....									
43 By pumping.....									
44 Supplied from wells.....									
45 Flowing.....	1,881	100			3		40		30
46 By pumping.....	1,881	100							9
47 Supplied from springs.....					3		40		21
48 Supplied from reservoirs.....	500	12	22	123			500	30	295
49 Total acreage supplied by pumping.....				798	3		77		21
IRRIGATION ENTERPRISES									
50 Independent enterprises.....									
51 Number in 1899..... number.....	312	70	404	329	10	31	145	188	99
52 Per cent of increase, 1899-1910.....									
53 Main ditches.....									
54 Number in 1899..... number.....	236	71	464	291	3	31	141	171	85
55 Per cent of increase, 1899-1910.....									
56 Length..... miles.....	609	212	415	819	6	33	186	300	193
57 Length in 1899..... miles.....									
58 Per cent of increase, 1899-1910.....									
59 Capacity..... cubic feet per second.....	8,542	2,681	791	3,474	20	129	764	794	1,157
60 Length..... number.....	93	47	622	89	4		40	97	24
61 Reservoirs..... miles.....	320	68	106	175	1		8	43	14
62 Capacity..... number.....	10	6	106	123	2	1	14	5	15
63 Capacity..... acre-feet.....	50,093	132,248		62,883	1		12,025	73	12,247
64 Flowing wells..... number.....	111	3							30
65 Capacity..... gallons per minute.....	24,587	1,792							1,064
66 Pumped wells..... number.....					4				1
67 Capacity..... gallons per minute.....					11				360
68 Pumping plants..... number.....				21	4		100		1
69 Engine capacity..... horsepower.....				131	3		20		8
70 Pump capacity..... gallons per minute.....				15,242	11		100		360
COST									
71 Cost of enterprises up to July 1, 1910..... dollars.....	927,647	2,000,999	137,565	1,568,770	21,581	12,671	581,214	133,956	187,211
72 Cost in 1899..... dollars.....									
73 Per cent of increase, 1899-1910.....									
74 Average cost per acre enterprises were capable of irrigating in 1910..... dollars.....	3.54	19.59	4.09	15.82	16.13	6.21	23.60	4.76	6.64
75 Average cost per acre irrigated in 1899..... dollars.....									
76 Estimated final cost of existing enterprises..... dollars.....	1,026,897	2,177,966	137,565	2,261,610	21,581	12,671	580,878	133,956	187,211
77 Average per acre included in projects..... dollars.....	3.06	8.52	3.97	12.94	16.13	6.17	23.22	4.07	4.52
OPERATION AND MAINTENANCE									
78 Acreage for which cost is reported.....	44,127	33,900		33,454	620		3,500		1,200
79 Total cost reported..... dollars.....	11,860	5,090		56,533	827		3,412		1,800
80 Average per acre for which cost is reported..... dollars.....	0.27	0.15		1.69	1.33		0.97		1.50
81 Average cost per acre in 1899..... dollars.....									
82 Per cent of increase, 1899-1909.....									

¹ Change of boundary. (See explanation at close of text.)

² Decrease.

IRRIGATION—COLORADO.

COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910—Continued.

[Comparative data for 1899 in italics.]

	Elbert.	Fremont.	Garfield.	Gilpin.	Grand.	Gunnison.	Hinsdale.	Huerfano.	Jackson.	Jefferson. ⁴
1 Number of all farms in 1910.....	1,150	896	965	43	249	277	24	462	178	1,417
2 Number of farms irrigated in 1909.....	34	839	868	2	226	261	22	350	163	1,151
3 Per cent of all farms.....	3.0	93.6	89.9	4.7	90.8	94.2	91.7	75.8	91.6	81.2
4 <i>Number of farms irrigated in 1899.....</i>	<i>17</i>	<i>688</i>	<i>487</i>	<i>16</i>	<i>168</i>	<i>286</i>	<i>30</i>	<i>345</i>	<i>(1)</i>	<i>751</i>
5 Per cent of increase, 1899-1909.....	100.0	42.7	78.2	² 87.5	47.7	15.5	² 26.7	1.4		
LAND AND FARM AREA										
6 Approximate land area..... acres.....	1,188,480	996,480	1,988,480	84,480	1,194,240	2,034,600	621,440	960,000	1,044,480	536,320
7 Land in farms..... acres.....	682,281	146,866	159,720	13,323	113,287	83,282	5,436	161,834	200,278	224,686
8 Improved land in farms..... acres.....	118,474	24,868	61,818	3,370	30,667	38,074	2,349	28,631	74,737	69,269
9 Acreage irrigated in 1909.....	7,628	24,737	61,617	43	42,194	55,848	2,924	26,598	151,850	57,336
10 Per cent of total land area.....	0.6	2.5	3.1	0.1	3.5	2.7	0.5	2.8	14.5	10.7
11 Per cent of land in farms.....	1.1	16.8	39.3	0.3	37.2	67.0	53.8	16.4	76.8	26.5
12 Per cent of improved land in farms.....	6.4	99.5	99.7	1.3	³ 140.2	³ 146.7	³ 124.5	92.9	³ 203.2	82.8
13 <i>Acreage irrigated in 1899.....</i>	<i>906</i>	<i>16,542</i>	<i>24,037</i>	<i>354</i>	<i>17,643</i>	<i>26,071</i>	<i>1,539</i>	<i>16,329</i>	<i>(1)</i>	<i>48,850</i>
14 Per cent of increase, 1899-1909.....	74.3	59.2	147.1	² 87.9	139.2	107.1	118.4	73.5		
15 Acreage enterprises were capable of irrigating in 1910.....	11,286	37,136	95,281	43	77,672	50,700	3,354	35,990	199,457	142,286
16 Acreage included in projects.....	20,361	42,414	133,321	290	98,209	73,895	5,220	60,878	244,967	293,163
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17 U. S. Reclamation Service, irrigated in 1909.....										
18 Enterprises were capable of irrigating in 1910.....										
19 Included in projects.....										
20 U. S. Indian Service, irrigated in 1909.....										
21 Enterprises were capable of irrigating in 1910.....										
22 Included in projects.....										
23 Carey Act enterprises, irrigated in 1909.....										
24 Enterprises were capable of irrigating in 1910.....										
25 Included in projects.....										
26 Irrigation districts, irrigated in 1909.....										
27 Enterprises were capable of irrigating in 1910.....										
28 Included in projects.....										
29 Cooperative enterprises, irrigated in 1909.....		7,379	4,114		4,470	2,433		1,855	4,000	33,424
30 Enterprises were capable of irrigating in 1910.....		15,475	8,800		19,190	2,460		2,488	12,000	69,971
31 Included in projects.....		10,875	17,560		35,570	2,460		21,300	12,000	69,971
32 Commercial enterprises, irrigated in 1909.....										12,919
33 Enterprises were capable of irrigating in 1910.....										58,528
34 Included in projects.....										207,632
35 Individual and partnership enterprises, irrigated in 1909.....	7,628	17,358	57,603	43	37,724	53,415	2,924	24,743	147,850	10,993
36 Enterprises were capable of irrigating in 1910.....	11,286	21,661	86,481	43	58,482	57,240	3,354	33,202	187,457	13,787
37 Included in projects.....	20,361	22,539	115,761	290	62,729	71,435	5,220	45,578	232,967	15,660
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38 Supplied from streams.....	7,508	24,290	59,916	43	41,329	55,527	2,924	26,568	151,710	50,922
39 By gravity.....	7,568	23,594	59,916	43	41,329	55,427	2,924	26,568	151,710	50,882
40 By pumping.....		596				100				40
41 Supplied from lakes.....			25						80	4
42 By gravity.....			25						80	4
43 By pumping.....										
44 Supplied from wells.....		236						5		30
45 Flowing.....		209								
46 By pumping.....		27						5		30
47 Supplied from springs.....	60	161	914		285	221		25		40
48 Supplied from reservoirs.....		59	702		580	100			60	340
49 Total acreage supplied by pumping.....		623				100		5		74
IRRIGATION ENTERPRISES										
50 Independent enterprises..... number.....	37	413	440	2	328	507	41	263	328	163
51 <i>Number in 1899⁴.....</i>										
52 Per cent of increase, 1899-1910.....										164
53 Main ditches..... number.....	30	366	374	2	326	448	31	266	325	164
54 <i>Number in 1899⁴.....</i>										
55 Per cent of increase, 1899-1910.....										640
56 Length..... miles.....	30	337	870	1	497	466	28	427	743	640
57 <i>Length in 1899⁵.....</i>										
58 Per cent of increase, 1899-1910.....										
59 Capacity..... cubic feet per second.....	427	1,058	4,401	1	3,508	6,034	183	1,600	6,896	4,623
60 Laterals..... number.....	67	363	80		173	41	6	187	142	31
61 Length..... miles.....	4	122	54		94	7	2	106	79	67
62 Reservoirs..... number.....	8	26	14		21	1		37	6	79
63 Capacity..... acre-feet.....	1,456	18,879	5,049		3,344	125		12,714	2,150	136,519
64 Flowing wells..... number.....		60								
65 Capacity..... gallons per minute.....		1,371						1		3
66 Pumped wells..... number.....		5								355
67 Capacity..... gallons per minute.....		1,169						1,200		7
68 Pumping plants..... number.....		9				1		1		26
69 Engine capacity..... horsepower.....		225				56		10		929
70 Pump capacity..... gallons per minute.....		8,921				3,600		1,200		
COST										
71 Cost of enterprises up to July 1, 1910..... dollars.....	35,215	1,505,440	1,458,678	625	432,231	207,622	11,047	257,959	275,899	4,300,968
72 <i>Cost in 1899⁵.....</i>										
73 Per cent of increase, 1899-1910.....										
74 Average cost per acre enterprises were capable of irrigating in 1910..... dollars.....	3.12	40.54	15.31	14.53	5.57	3.48	3.29	7.23	1.38	30.23
75 <i>Average cost per acre irrigated in 1899⁵.....</i>										
76 Estimated final cost of existing enterprises..... dollars.....	35,215	1,588,971	1,498,678	625	504,654	207,622	11,047	273,959	275,899	5,170,968
77 Average per acre included in projects..... dollars.....	1.73	37.46	11.24	2.16	6.13	2.81	2.12	4.10	1.13	17.64
OPERATION AND MAINTENANCE										
78 Acreage for which cost is reported.....		6,379	4,114		705	1,740		1,855		40,423
79 Total cost reported..... dollars.....		25,411	11,226		610	1,700		1,528		47,691
80 Average per acre for which cost is reported..... dollars.....		3.98	2.73		0.87	0.98		0.82		1.18
81 <i>Average cost per acre in 1899⁵.....</i>										
82 Per cent of increase, 1899-1909.....										

³ Irrigated acreage includes wild grass, while improved land in farms does not.

⁴ Not reported.

⁵ Not reported by counties.

IRRIGATION—COLORADO.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND

[Comparative data for 1899 in italics.]

	Kiowa.	Kit Car-son.	La Plata.	Lake.	Larimer. ¹	Las Ani-mas.	Lincoln.	Logan.	Mesa.	Mineral.
1	646	1,767	735	57	1,830	954	1,334	1,359	2,348	33
2	6	8	634	43	1,491	447	1	272	2,238	28
3	0.9	0.5	86.3	75.4	81.5	46.9	0.1	20.0	95.3	84.8
4	3	23	220	56	1,256	549	17	226	742	32
5	100.0	2 65.2	188.2	2 23.2		2 18.5	2 94.1	20.4	201.6	2 12.5
LAND AND FARM AREA										
6	1,150,720	1,381,760	1,184,640	237,440	1,682,560	3,077,760	1,044,800	1,169,080	2,024,320	554,240
7	219,660	566,587	161,709	20,948	505,524	445,298	423,115	409,487	174,584	18,646
8	21,667	140,399	41,390	7,998	177,525	48,085	105,053	115,019	73,508	7,036
9	1,460	638	40,840	10,967	170,600	26,093	190	63,166	71,942	7,762
10	0.1	(*)	3.4	4.6	10.1	0.8	(*)	5.4	3.6	1.4
11	0.7	0.1	26.9	52.4	33.7	5.9	(*)	15.4	41.2	41.6
12	6.7	0.5	98.7	137.1	96.1	54.3	0.2	54.9	97.9	4 110.3
13	168	859	10,771	7,380	169,028	24,061	1,678	8,913	33,223	2,640
14	824.1	2 25.7	279.2	48.6		5.8	2 90.5	608.7	116.5	194.0
15	1,400	788	109,479	11,647	178,952	32,596	100	65,345	92,092	9,370
16	2,310	868	161,387	16,350	316,992	35,149	100	87,301	182,942	10,590
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17	U. S. Reclamation Service, irrigated in 1909.									
18	Enterprises were capable of irrigating in 1910.									
19	Included in projects.									
20	U. S. Indian Service, irrigated in 1909.									
21	Enterprises were capable of irrigating in 1910.									
22	Included in projects.									
23	Carey Act enterprises, irrigated in 1909.									
24	Enterprises were capable of irrigating in 1910.									
25	Included in projects.									
26	Irrigation districts, irrigated in 1909.									
27	Enterprises were capable of irrigating in 1910.									
28	Included in projects.									
29	Cooperative enterprises, irrigated in 1909.									
30	Enterprises were capable of irrigating in 1910.									
31	Included in projects.									
32	Commercial enterprises, irrigated in 1909.									
33	Enterprises were capable of irrigating in 1910.									
34	Included in projects.									
35	Individual and partnership enterprises, irrigated in 1909.									
36	Enterprises were capable of irrigating in 1910.									
37	Included in projects.									
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38	Supplied from streams.									
39	1,225	585	40,351	10,967	169,534	25,991		62,761	71,590	7,762
40	1,225	585	40,360	10,967	169,304	25,991		62,761	60,807	7,762
41			1		230				10,783	
42	230				200					
43	230				200					
44	Supplied from wells.									
45	5	3	209		104			15	52	
46	3		200							
47	2	3			104			15	52	
48		50	109		542	102	160		300	
49	2	3	180		220			390		
50	2	3	1		534			15	10,835	
IRRIGATION ENTERPRISES										
50	Independent enterprises.									
51	6	7	262	55	221	139	1	36	275	40
52	<i>Number in 1899</i>									
53	Per cent of increase, 1899-1910.									
54	4	5	257	39	217	88	1	35	259	44
55	<i>Number in 1899</i>									
56	Per cent of increase, 1899-1910.									
57	7	6	480	71	758	161	3	215	592	47
58	<i>Length in 1899</i>									
59	22	65	2,662	530	7,176	1,193	34	2,596	5,000	217
60	4	4	52	9	136	16	8	8	62	12
61	2	2	125	16	368	7	23	150	8	8
62	1	3	7		84	7	4	4	42	
63	1	55	7,456		263,388	427		1,929	10,172	
64	Flowing wells.									
65	1		4							
66	10		89							
67	2	2			2			1	2	
68	2	26			877			600	80	
69	1	1	2		5			1	31	
70	1	1	136		80			10	5,991	
71	4	25	2,716		1,659			600	178,273	
COST										
71	7,975	3,165	688,774	46,106	5,576,639	155,583	500	388,862	3,024,019	19,514
72	<i>Cost in 1899</i>									
73	Per cent of increase, 1899-1910.									
74	5.46	4.02	6.29	3.97	31.16	4.78	3.50	5.95	32.84	2.08
75	<i>Average cost per acre irrigated in 1899</i>									
76	7.975	3.165	855,311	46,196	9,026,639	155,583	560	388,862	6,745,382	19,514
77	3.45	3.65	5.65	2.82	28.48	4.43	3.50	4.45	36.87	1.84
OPERATION AND MAINTENANCE										
78	Acreage for which cost is reported.									
79	Total cost reported.									
80	Average per acre for which cost is reported.									
81	<i>Average cost per acre in 1899</i>									
82	Per cent of increase, 1899-1900.									

¹ Change of boundary. (See explanation at close of text.)

² Decrease.

³ Less than one-tenth of 1 per cent.

IRRIGATION—COLORADO.

COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910—Continued.

[Comparative data for 1899 in italics.]

	Monte- zuma.	Montrose.	Morgan.	Otero.	Ouray.	Park. ¹	Pitkin.	Prowers.	Pueblo.	Rio Blanco.
1 Number of all farms in 1910.....	1,004	1,138	1,075	1,498	189	194	191	991	1,103	341
2 Number of farms irrigated in 1909.....	516	1,042	561	1,310	184	162	182	546	753	285
3 Per cent of all farms.....	51.4	91.6	52.2	87.4	97.4	83.5	95.3	55.1	68.3	83.6
4 <i>Number of farms irrigated in 1899.....</i>	<i>240</i>	<i>468</i>	<i>305</i>	<i>762</i>	<i>128</i>	<i>172</i>	<i>153</i>	<i>377</i>	<i>501</i>	<i>239</i>
5 Per cent of increase, 1899-1909.....	115.0	122.6	83.9	71.9	43.8	.....	19.0	44.8	34.2	19.2
LAND AND FARM AREA										
6 Approximate land area..... acres.	1,312,640	1,448,960	823,040	1,322,880	332,160	1,415,680	652,160	1,043,200	1,557,120	2,062,720
7 Land in farms..... acres.	159,204	151,375	233,269	254,185	48,833	181,199	45,280	250,317	630,114	104,386
8 Improved land in farms..... acres.	31,112	65,136	98,721	143,114	14,612	40,205	15,158	102,240	63,426	36,760
9 Acreage irrigated in 1909.....	27,176	55,993	97,849	122,457	15,621	64,524	15,152	71,634	50,718	32,830
10 Per cent of total land area.....	2.1	3.9	11.9	9.3	4.7	4.6	2.3	6.9	3.3	1.6
11 Per cent of land in farms.....	17.1	37.0	41.9	48.2	32.0	35.8	33.5	28.6	8.0	31.5
12 Per cent of improved land in farms.....	87.3	86.0	99.1	85.6	106.9	140.3	100.0	70.1	80.0	89.3
13 <i>Acreage irrigated in 1899.....</i>	<i>12,240</i>	<i>34,132</i>	<i>37,012</i>	<i>62,268</i>	<i>10,440</i>	<i>39,361</i>	<i>12,088</i>	<i>46,092</i>	<i>35,948</i>	<i>21,381</i>
14 Per cent of increase, 1899-1909.....	121.9	64.0	164.4	96.6	49.6	.....	25.3	55.5	41.1	63.5
15 Acreage enterprises were capable of irrigating in 1910.....	62,757	92,194	114,933	198,460	20,337	65,384	29,719	74,632	69,442	37,353
16 Acreage included in projects.....	67,538	254,132	250,590	250,766	25,462	68,969	39,497	130,596	174,518	53,169
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17 U. S. Reclamation Service, irrigated in 1909.....	.....	14,600	.....	.....	.....	.....	.....	.....	.....	.....
18 Enterprises were capable of irrigating in 1910.....	.....	28,000	.....	.....	.....	.....	.....	.....	.....	.....
19 Included in projects.....	.....	138,000	.....	.....	.....	.....	.....	.....	.....	.....
20 U. S. Indian Service, irrigated in 1909.....	20	.....	.....	.....	.....	.....	.....	.....	.....	.....
21 Enterprises were capable of irrigating in 1910.....	20	.....	.....	.....	.....	.....	.....	.....	.....	.....
22 Included in projects.....	20	.....	.....	.....	.....	.....	.....	.....	.....	.....
23 Carey Act enterprises, irrigated in 1909.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24 Enterprises were capable of irrigating in 1910.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25 Included in projects.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26 Irrigation districts, irrigated in 1909.....	13,000	.....	19,668	18,550	.....	.....	.....	.....	450	.....
27 Enterprises were capable of irrigating in 1910.....	35,000	.....	19,668	45,525	.....	.....	.....	.....	475	.....
28 Included in projects.....	38,000	.....	121,668	49,525	.....	.....	.....	.....	475	.....
29 Cooperative enterprises, irrigated in 1909.....	2,935	19,688	59,488	99,164	1,090	.....	2,740	69,303	30,876	2,000
30 Enterprises were capable of irrigating in 1910.....	8,175	32,828	69,988	145,893	1,332	.....	5,775	71,132	52,794	3,000
31 Included in projects.....	9,175	64,928	107,225	183,198	1,332	.....	7,850	125,357	69,652	4,000
32 Commercial enterprises, irrigated in 1909.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	250
33 Enterprises were capable of irrigating in 1910.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	250
34 Included in projects.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	250
35 Individual and partnership enterprises, irrigated in 1909.....	11,221	21,705	18,693	4,743	14,531	64,824	12,412	2,381	13,392	30,580
36 Enterprises were capable of irrigating in 1910.....	19,562	31,366	25,277	7,042	10,005	65,384	23,944	3,500	16,173	34,103
37 Included in projects.....	20,343	51,204	30,697	18,043	24,130	68,969	31,647	5,239	104,301	48,919
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38 Supplied from streams.....	27,151	55,739	97,038	118,720	15,606	64,809	15,061	71,684	50,393	32,402
39 By gravity.....	27,151	55,739	97,038	118,420	15,606	64,809	15,061	71,684	50,387	32,120
40 By pumping.....	.....	.....	.....	300	.....	.....	.....	.....	6	282
41 Supplied from lakes.....	.....	.....	.....	.....	.....	15	2	.....	40	.....
42 By gravity.....	.....	.....	.....	.....	.....	15	2	.....	40	.....
43 By pumping.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
44 Supplied from wells.....	.....	20	11	227	.....	.....	4	.....	31	.....
45 Flowing.....	.....	.....	.....	.....	.....	.....	.....	.....	20	.....
46 By pumping.....	.....	20	11	227	.....	.....	4	.....	11	.....
47 Supplied from springs.....	10	221	.....	.....	15	.....	85	.....	254	428
48 Supplied from reservoirs.....	15	13	800	3,510	.....	.....	.....	.....	.....	.....
49 Total acreage supplied by pumping.....	.....	20	11	527	.....	.....	4	.....	17	282
IRRIGATION ENTERPRISES										
50 Independent enterprises..... number..	141	200	49	47	137	282	165	25	190	202
51 <i>Number in 1899⁶.....</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
52 Per cent of increase, 1899-1910.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
53 Main ditches..... number..	150	192	48	37	138	276	124	20	173	191
54 <i>Number in 1899⁶.....</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
55 Per cent of increase, 1899-1910.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
56 Length..... miles..	268	541	537	327	252	363	253	218	436	354
57 <i>Length in 1899⁶.....</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
58 Per cent of increase, 1899-1910.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
59 Capacity..... cubic feet per second..	1,590	3,983	6,454	6,553	1,085	4,211	1,002	2,286	5,181	1,120
60 Laterals..... number..	38	58	15	53	41	718	17	82	91	118
61 Length..... miles..	158	164	42	123	15	185	5	148	109	70
62 Reservoirs..... number..	11	15	17	40	7	1	9	7	54	10
63 Capacity..... acre-feet..	37,600	119,381	181,073	130,504	441	1	1,874	183,381	109,307	384
64 Flowing wells..... number..	.....	.....	.....	.....	.....	.....	.....	.....	4	.....
65 Capacity..... gallons per minute..	.....	.....	.....	.....	.....	.....	.....	.....	2,168	.....
66 Pumped wells..... number..	1	3	14	.....	.....	.....	1	.....	3	.....
67 Capacity..... gallons per minute..	170	1,581	6,205	.....	.....	.....	34	.....	145	.....
68 Pumping plants..... number..	1	3	15	.....	.....	.....	1	.....	4	9
69 Engine capacity..... horsepower..	3	25	87	.....	.....	.....	1	.....	9	87
70 Pump capacity..... gallons per minute..	170	1,581	15,185	.....	.....	.....	34	.....	165	4,320
COST										
71 Cost of enterprises up to July 1, 1910..... dollars.	1,026,977	4,769,186	4,821,813	3,197,415	159,091	213,233	237,523	1,453,019	1,511,694	269,479
72 <i>Cost in 1899⁶.....</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
73 Per cent of increase, 1899-1910.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
74 Average cost per acre enterprises were capable of irrigating in 1910..... dollars.	16.36	51.73	41.95	16.11	7.82	3.26	7.99	19.47	21.77	7.21
75 <i>Average cost per acre irrigated in 1899⁶.....</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
76 Estimated final cost of existing enterprises..... dollars.	1,091,974	9,751,075	6,004,613	3,631,587	159,091	213,233	252,554	1,453,019	1,693,321	269,479
77 Average per acre included in projects..... dollars.	16.17	38.37	23.13	14.48	6.25	3.09	6.39	11.13	9.70	5.07
OPERATION AND MAINTENANCE										
78 Acreage for which cost is reported.....	15,935	29,010	79,156	116,714	1,090	.....	2,740	69,303	35,132	.....
79 Total cost reported..... dollars.	22,025	22,390	39,511	71,349	206	.....	5,135	43,899	31,473	.....
80 Average per acre for which cost is reported..... dollars.	1.38	0.76	0.50	0.61	0.19	.....	1.87	0.63	0.90	.....
81 <i>Average cost per acre in 1899⁶.....</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
82 Per cent of increase, 1899-1909.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

¹ Irrigated acreage includes wild grass, while improved land in farms does not.

⁶ Not reported.

⁶ Not reported by counties.

IRRIGATION—COLORADO.

ACREAGE IRRIGATED, EXTENT AND COST OF IRRIGATION ENTERPRISES, AND COST OF OPERATION AND MAINTENANCE, BY COUNTIES: 1909 AND 1910—Continued.

[Comparative data for 1899 in italics.]

	Rio Grande.	Routt.	Saguache.	San Miguel.	Sedgwick.	Summit.	Teller.	Washington. ¹	Weld.	Yuma. ¹
1	519	1,113	363	140	448	96	208	1,346	3,981	1,820
2	517	588	338	121	141	90	32	47	2,578	23
3	99.6	52.8	93.1	86.4	31.5	93.8	15.4	3.5	04.8	1.3
4	351	552	364	108	81	72	41	25	1,814	22
5	47.3	65.2	7.1	12.0	74.1	25.0	22.0		42.1	
LAND AND FARM AREA										
6	574,720	4,458,880	2,005,120	824,320	330,840	415,360	350,080	1,013,440	2,574,080	1,514,880
7	149,704	330,233	282,741	35,000	150,289	24,844	80,313	551,198	914,220	658,318
8	115,890	92,323	217,102	19,130	58,205	6,503	10,943	117,986	410,340	318,152
9	107,551	62,427	145,874	14,712	22,023	8,402	1,370	5,595	395,514	3,890
10	18.7	1.4	7.3	1.8	0.5	2.0	0.4	0.3	15.4	0.3
11	71.9	18.9	51.6	41.3	13.8	33.8	1.7	1.0	43.3	0.6
12	92.8	07.6	07.2	76.9	37.8	129.2	12.5	4.7	96.4	1.2
13	71,325	44,648	76,009	5,425	4,779	3,551	381	5,009	226,615	856
14	50.8	40.2	92.2	171.2	300.8	137.9	55.6		74.5	
15	298,021	110,569	150,943	20,421	23,260	11,739	1,435	6,027	434,008	6,200
16	353,037	157,298	157,508	21,653	53,020	10,489	1,604	7,969	629,433	8,275
ACREAGE IRRIGATED AND INCLUDED IN PROJECTS										
CLASSIFIED BY CHARACTER OF ENTERPRISE.										
17	U. S. Reclamation Service, irrigated in 1909									
18	Enterprises were capable of irrigating in 1910.....									
19	Included in projects.....									
20	U. S. Indian Service, irrigated in 1909									
21	Enterprises were capable of irrigating in 1910.....									
22	Included in projects.....									
23	Carey Act enterprises, irrigated in 1909									
24	Enterprises were capable of irrigating in 1910.....									
25	Included in projects.....									
26	Irrigation districts, irrigated in 1909									
27	Enterprises were capable of irrigating in 1910.....									
28	Included in projects.....									
29	Cooperative enterprises, irrigated in 1909									
30	Enterprises were capable of irrigating in 1910.....									
31	Included in projects.....									
32	Commercial enterprises, irrigated in 1909									
33	Enterprises were capable of irrigating in 1910.....									
34	Included in projects.....									
35	Individual and partnership enterprises, irrigated in 1909									
36	Enterprises were capable of irrigating in 1910.....									
37	Included in projects.....									
ACREAGE IRRIGATED										
CLASSIFIED BY SOURCE OF WATER SUPPLY.										
38	Supplied from streams.....									
39	By gravity.....									
40	By pumping.....									
41	Supplied from lakes.....									
42	By gravity.....									
43	By pumping.....									
44	Supplied from wells.....									
45	Flowing.....									
46	By pumping.....									
47	Supplied from springs.....									
48	Supplied from reservoirs.....									
49	Total acreage supplied by pumping.....									
IRRIGATION ENTERPRISES										
50	Independent enterprises.....number.....									
51	Number in 1899 ⁴									
52	Per cent of increase, 1899-1910.....									
53	Main ditches.....number.....									
54	Number in 1899 ⁴									
55	Per cent of increase, 1899-1910.....									
56	Length.....miles.....									
57	Length in 1899 ⁵									
58	Per cent of increase, 1899-1910.....									
59	Capacity.....cubic feet per second.....									
60	Laterals.....number.....									
61	Length.....miles.....									
62	Reservoirs.....number.....									
63	Capacity.....acre-feet.....									
64	Flowing wells.....number.....									
65	Capacity.....gallons per minute.....									
66	Pumped wells.....number.....									
67	Capacity.....gallons per minute.....									
68	Pumping plants.....number.....									
69	Engine capacity.....horsepower.....									
70	Pump capacity.....gallons per minute.....									
COST										
71	Cost of enterprises up to July 1, 1910.....dollars.....									
72	Cost in 1899 ⁵									
73	Per cent of increase, 1899-1910.....									
74	Average cost per acre enterprises were capable of irrigating in 1910.....dollars.....									
75	Average cost per acre irrigated in 1899 ⁶									
76	Estimated final cost of existing enterprises.....dollars.....									
77	Average per acre included in projects.....									
OPERATION AND MAINTENANCE										
78	Acreage for which cost is reported.....									
79	Total cost reported.....dollars.....									
80	Average per acre for which cost is reported.....dollars.....									
81	Average cost per acre in 1899 ⁶.....dollars.....									
82	Per cent of increase, 1899-1909.....									

¹ Change of boundary. (See explanation at close of text.)
⁴ Not reported.

² Decrease.

³ Irrigated acreage includes wild grass, while improved land in farms does not.
⁶ Not reported by counties.